FUNDAMENTALS IN SCHOOL GEOGRAPHY

FUNDAMENTALS IN SCHOOL GEOGRAPHY

A BOOK FOR TEACHERS AND STUDENTS IN TRAINING

BY

OLIVE GARNETT B.A.

SENIOR LECTURER IN GEOGRAPHY AT THE
FROEBEL EDUCATIONAL INSTITUTE
TRAINING COLLEGE FOR TEACHERS

WITH ILLUSTRATIONS MAPS AND DIAGRAMS

NEW EDITION REVISED

GEORGE G. HARRAP & CO. LTD
LONDON TORONTO WELLINGTON SYDNEY

PREFACE TO THE SECOND EDITION

SINCE 1934, when this book was first published, certain changes have taken place in our educational system, notably those introduced by the Education Act of 1944. There have also been developments in educational practice. Wider recognition is now given to activity methods, integrated studies, field work, etc. Outdoor observation and exploration, which come naturally to children, and which form the basis of all geography, are now recognized as an essential part of school work. In many primary schools, particularly in work for children younger than nine, 'geography' as the name of a subject has vanished, along with the names of other subjects—terms of which the children cannot as yet understand the meaning.

The fact remains that, from the age of about seven upward, the interests of children frequently lead them to pursue topics that are partly or even largely geographical. Children also come to feel the need for some of the geographical tools and materials, especially maps. The substance of modern geography, at least at the school stage, is very close to everyday life and to the interests of children. Any junior-school programme based on children's interests is likely to devote more time than formerly to work that is geographical, although there may be nothing called 'geography' on the time-table. It is therefore no less desirable than hitherto that junior-school teachers should be aware of the nature and standards of geography, although they may not teach the subject as such. Without this awareness on the teacher's part, the result of progressive methods, for the children, may be at best vagueness or lost opportunities, and at worst discouragement of interests or the learning of mistakes. Serious misconceptions gained at the primary stage are very difficult to eradicate later, if and when they are discovered; and the greater the interest at the time of learning the more indelible is the impression. The freedom

and elasticity of modern methods have increased both the opportunities and the responsibilities of teachers, for it is now possible to ensure that, from the children's point of view, the right thing is learned in the right way at the right time.

The demand for a reprint has afforded an opportunity to bring this book as far as possible up to date. Parts have been rewritten, a few illustrations changed, and some removed to allow space for additional text. It has seemed unnecessary to replace all examples that are somewhat dated (for instance, that referring to the *Berengaria*, p. 127) when the points they illustrate are no less true to-day. Educational terminology has changed a little since 1934. Yet the term 'junior' still holds meaning, and, partly because it is more precise than 'primary' and shorter than 'primary age range seven to eleven' it has been retained.

In addition to points that hold good for work with pupils up to any age, many of the suggestions for junior work may prove helpful to teachers in secondary modern schools, particularly with children who are retarded or whose earlier training has not been along the lines suggested here. In any case the work of the primary school should be revised in a new context, developed and applied, in the work that follows it.

O. G.

September 1948

NOTE

The book lists can be supplemented by reference to the classified lists of books and other sources of information to be found in:

CONS, G. J. (General Editor): *Handbook for Geography Teachers*, prepared by the Standing Sub-committee in Geography of the University of London Institute of Education (Methuen, 1955 and subsequently).

SAXELBY, C. H. (General Editor): *A Geographer's Reference Book* (the Geographical Association, 1955).

PREFACE TO THE FIRST EDITION

In preparatory and junior schools geography often has to be taught as one of many general form subjects by teachers whose acquaintance with geography does not go very far, and who feel the need for detailed guidance concerning its scope and requirements. On the other hand, when specialists come from the upper or senior departments to teach the younger children they often find that the advanced nature of their own knowledge makes it difficult for them to approach the subject *with* the children, and some, particularly inexperienced teachers, are inclined to overlook, or to regard as obvious, the very facts, etc., that the children need to learn.

This book has been written with the requirements of both types of teacher in mind, but is intended primarily for students in training, and particularly for those preparing to teach children between the ages of six and twelve plus—*i.e.*, in the case of elementary schools, in the last year of the infant school, throughout the junior school, and in the first years of the senior school. During these years of a child's life it is important that the foundations of geography should be well laid, not only for the sake of future work in the subject, nor even on account of its importance in other subjects, but also because the fundamentals of geography are necessary for intelligent life in the world—to the child as well as to the adult.

Although the book is concerned largely with the work of preparatory and junior schools, much of what it contains applies also to geography for older children. If their work is to be intelligently carried out neither junior- nor senior-school teachers should be ignorant of the type of studies made by the children in the other school or department. For these and other reasons it has seemed advisable in some

chapters to discuss matters that apply to the geographical work of children up to the age of sixteen.

The book does not attempt to give an exhaustive treatise on the methodology of geography. Its purpose is to help the young teacher in dealing with problems that frequently arise, and to call attention to points of which the teacher without specialist knowledge is often unaware. It has seemed best to do this by discussing actual examples of children's work. The illustrations are simply those which have come to hand in the ordinary course of school teaching. They refer to experience in both urban and rural districts with both boys and girls in schools of many types (including elementary, secondary, preparatory, and high schools). Where not otherwise stated the majority of examples and illustrations are taken from work done at the Froebel Educational Institute Demonstration Schools, at Colet Gardens, West Kensington, and at Grove House, Roehampton (chiefly the former). Miss K. E. Chester and members of her staff have kindly allowed me to use the examples from Putney High School.

In order to help the inexperienced teacher and the novice in geography to make acquaintance with some of the more valuable publications a short bibliography is given at the end of each chapter.

My thanks are due to those geographers, educationists, and others whose work has been a source of guidance for many years, and whose influence must be apparent in these pages. In addition I should like to express my indebtedness to the teachers, students, and children with whom I have worked, and who, unknown to themselves, have played a part in the making of this book.

O. G.

FROEBEL EDUCATIONAL INSTITUTE
ROEHAMPTON
LONDON, S.W.
April 1934

CONTENTS

CONTENTS

ILLUSTRATIONS

FUNDAMENTALS IN SCHOOL GEOGRAPHY

CHAPTER I

THE PURPOSE OF SCHOOL GEOGRAPHY

AMONG the writings of one who is known to the world not as a geographer, but as an Indian philosopher and poet,[1] is a passage of considerable interest to those who teach geography. It is worth careful study, even though some statements may not, perhaps, be accepted exactly as they stand.

> In the present age, with its facility of communication, geographical barriers have almost lost their reality, and the great federation of men, which is waiting either to find its true scope or to break asunder in a final catastrophe, is not a meeting of individuals, but of various human races. Now the problem before us is of one single country, which is this earth, where the races as individuals must find both their freedom of self-expression and their bond of federation. Mankind must realize a unity, wider in range, deeper in sentiment, stronger in power, than ever before. Now that the problem is large we have to solve it on a bigger scale, to realize the God in man by a larger faith and to build the temple of our faith on a sure and world-wide basis.
>
> The first step towards realization is to create opportunities for revealing the different peoples to one another. . . .
>
> When the science of meteorology knows the earth's atmosphere as continuously one, affecting the different parts of the world differently, but in a harmony of adjustments, it knows and attains truth. And so, too, we must know that the great mind of man is one, working through the many differences which are needed to ensure the full result of its fundamental unity. When we understand this truth in a disinterested spirit

[1] Sir Rabindranath Tagore.

it teaches us to respect all the differences in man that are real, yet remain conscious of our oneness; and to know that perfection of unity is not in uniformity, but in harmony.[1]

This passage seemed appropriate when the first edition of this book was published, in 1934. It is no less applicable to-day, when, after the Second World War, ideals similar to those put forward by Tagore are in the minds of many who proclaim a vision of "perfection of unity" which is "not in uniformity but in harmony," although there is still a fear that the "great federation of men" may "break asunder in a final catastrophe." Within our own time some efforts towards a realization of perfection of unity—*i.e.*, harmony—have not only been made, but have met with a success which to a former generation would have appeared impossible. On the other hand, the present and future generations are faced with problems of a greater magnitude and complexity than ever before. Many of them are traceable directly to the destruction and dislocation caused by the war. But this is not true for all. For example, inter-racial problems (some associated with the 'colour bar'), and those connected with the increase and distribution of population, with poverty and malnutrition (*e.g.*, in India), were with us before the war. Problems of international finance, production and trade, disarmament, etc., are world problems, which no nation can solve for herself by herself. Like the problems connected with the desire of subject peoples and small nations for political independence, they call for "a disinterested spirit" which "teaches us to respect all the differences in man that are real, yet remain conscious of our oneness." It is at least true that all peoples are now more clearly aware of the economic, social, international, and inter-racial questions, many of which will have to be solved within the lifetime of those who are now children at school.

Children of this country will become citizens of the world in ways that are more apparent than is the case for citizens

[1] *Creative Unity* (Macmillan, 1912), pp. 170–172; quoted by permission of the author and publishers.

of some other countries. This is not only due to the very close dependence of Britain on her trade and other interests in all parts of the world, of which her dependence on overseas sources for food and raw materials is but one of many aspects. It is also due to facts traceable, at least in part, to her geographical position—in the heart of the land hemisphere and between the old world and the new—a position of significance in her own development, and in her place and function among the nations, past, present, and future.

Another type of problem which concerns citizens of the British Empire is that with which we are faced in our colonies and mandated territories, where we are responsible for the welfare of native peoples, and have to grapple with difficulties and responsibilities of many kinds—administrative, social, economic, political, and educational. There are also the questions that concern our own land individually, the problems connected with the best use of our resources, human and material; such matters, for example, as town and country planning, and nationalization or socialization of certain parts of our basic economy. In a democracy nationalization, of any of the country's assets, presupposes a sufficient understanding, on the part of the electorate, to ensure wise decisions as to the handling of those assets.

To shoulder their responsibilities, national and international, our people will need not only disinterested sympathy, but ability to grasp many sides of a complicated situation. This demands, among other things, a full and accurate background of world knowledge, as well as knowledge about our own country, both within herself and in relation to others. To geography, more than to any other school subject, are given opportunities and, therefore, responsibilities for building in the minds of those now at school at least a rudimentary foundation towards this end. "The first step towards realization is to create opportunities for revealing the different peoples to one another"—and that is largely a function of geography. As Mr Fairgrieve[1] has stated, "The function of geography is to train future

[1] J. Fairgrieve, *Geography in School* (University of London Press, 1937).

citizens to imagine accurately the conditions of the great world stage, and so to help them to think sanely about the problems of the world around."

It is not suggested that any amount of school work could equip even a genius to understand completely any one problem of the types indicated above. But school work can and should give a background that will help the future generation to become aware of the significance, interest, and importance of these problems, and also to approach them with sufficient openness of mind.

Other school subjects besides geography take a part in this work, but perhaps the lion's share of it falls within the province of geography.

To fulfil these responsibilities the geography taught and learned in school must have certain characteristics:

(i) The ideas and impressions it creates must be true, faithful to realities, and scrupulously unbiased. There must be "accuracy of imagination" and exactness in expressing facts and ideas.

(ii) Since only a small fractional amount of information concerning any geographical topic can be learned at school, that which *is* learned should not be regarded as complete and final. It should always be clear that there is much more to know.

(iii) Habits of clear thinking should be developed. These will include an ability to look from cause to effect and from effect to cause with a careful consideration of facts—the use of scientific reasoning. Generalizations and sweeping statements (even though found in text-books) should be avoided or approached critically, and with sufficient humility of mind.

(iv) Human beings, their characteristics, habits, and occupations, are not merely 'the product of environment,' and geography should include or be related to studies of men themselves—*e.g.*, as expressed in their literature or stories, arts and crafts, interests, etc.—all of which may reflect, but are not entirely determined by, the geography of their environment.

It will be seen from the above that geography has an educational value quite apart from the knowledge which it conveys. Geography is a scientific subject, giving training in scientific methods of work and thought. It should be a humanistic subject, considering the life and work, interests and thoughts, ideas and ideals, of mankind the world over, enabling those who study it to see their own lives more nearly in perspective, and calling for a broader outlook and vision, a deeper understanding and sympathy. It develops qualities and characteristics useful in ordinary daily life, giving both a background of information and an attitude of mind invaluable not only to anyone engaged in business or commerce, politics or statesmanship, but to every man or woman who reads a newspaper.

As a study of 'the earth as the home of man' geography considers man's life and activities chiefly in so far as they are conditioned by his environment. It therefore includes a study of man *and* of his environment. Aspects which concern the environment only are chiefly those called physical geography and plant and animal geography. Physical geography includes a study of the earth itself, particularly of the conditions of its surface and of the varieties of its climates. Human geography considers the life and work of mankind in relation to all these aspects of environment. Economic geography is largely concerned with the geography of production and trade, and is therefore of special interest to industrial nations like our own for whom the whole world is their environment, in that they depend on all parts of it to supply their needs.

Geographers recognize these different aspects of their subject for convenience in study, but they emphasize the fact that geography cannot literally be divided into sections under such headings. The fact that physical geography is often called the *physical basis of geography* is significant. In this connexion it seemed desirable, fifteen years ago, to point out that physical geography should not be taught as an entity in itself. The pendulum now appears to have swung too far, and simple facts of physical geography do not

always receive the attention that should be paid to the *basic* part of a study. Yet children's questions often reveal a keen interest in topics of physical geography. In fact, children sometimes appear to seek intuitively for the basis of the subject (although, at first, the facts they desire may be descriptive rather than explanatory).

"School geography must be the geography of geographers."[1] That is to say, although they may not know it as 'geography,' nothing but the real thing, scientific truth, should be offered to children of any age. The whole truth is often beyond the children's comprehension, but an inquiring child should be answered with the truth as far as he can understand it. This is widely accepted. Yet popular fallacies are still passed on to eager children; and books that present 'geography' bearing some of the trappings of a fairy-tale are still to be found in the schools. Such mistakes are due to inadequate knowledge of children, as well as of geography. It cannot be too strongly emphasized that geographical work (in common with all school activity, of which it is an integral part), should be *attacked by* the children *in their own way*—a way that is scientifically sound—when their interests and capacities lead them naturally towards it.

SUGGESTIONS FOR READING

(*A*) Books and Articles dealing with the Scope and Purpose of Geography

Barker, W. H.: *Geography in Education and Citizenship* (University of London Press, 1927).

Barnard, H. C.: *Principles and Practice of Geography Teaching* (University Tutorial Press, 1948).

Bradford, E. J. G.: *School Geography*, Chapter I (Benn, 1925).

Branom, M. E. and F. K.: *The Teaching of Geography*, Chapter V (Ginn, 1925).

Brown, R. N. Rudmose, Howarth, O. J. R., and McFarlane, J.: *The Scope of School Geography* (Oxford University Press, 1922).

Dickinson, R. E., and Howarth, O. J. R.: *The Making of Geography* (Oxford University Press, 1933).

[1] *Report of the Research Committee of the British Association on the Teaching of Geography*, 1924.

FAIRGRIEVE, J.: *Geography in School*, Chapters I and II (University of London Press, 1949).

INCORPORATED ASSOCIATION OF ASSISTANT MASTERS IN SECONDARY SCHOOLS: *The Teaching of Geography in Secondary Schools* (Philip, 1953).

NORWOOD, SIR C.: "Address to the Geographical Association" (*Geography*, March 1946).

ROXBY, P. M.: "The Scope and Aims of Human Geography" (*Report of the British Association for the Advancement of Science*, 1930).

UNIVERSITY OF LONDON INSTITUTE OF EDUCATION STANDING SUB-COMMITTEE IN GEOGRAPHY: *Handbook for Geography Teachers* (ed. by G. J. CONS) (Methuen, 1955).

WELPTON, W. P.: *The Teaching of Geography*, Chapter I (University Tutorial Press, 1923).

WOOLDRIDGE, S. W., and EAST, W. G.: *The Spirit and Purpose of Geography* ("Hutchinson's University Library," 1951).

The Teaching of Geography in Relation to the World Community, "The School and the World Community" series, Pamphlet No. I (Cambridge University Press, 1933).

Geography in the Primary School (The Geographical Association, 1953).

(*B*) GENERAL WORKS

ANDERSON, M. S.: *Geography of Living Things* (English Universities Press, 1951).

BLACHE, P. VIDAL DE LA (ed. E. DE MARTONNE): *Principles of Human Geography* (translation; Constable, 1926).

BRUNHES, J.: *Human Geography* (translation; Harrap, 1952).

DARBY, H. C.: *The Theory and Practice of Geography. An Inaugural Lecture* (Hodder and Stoughton, 1946).

DEBENHAM, F.: *The Use of Geography* (English Universities Press, 1950).

JAMES, PRESTON E.: *A Geography of Man* (Ginn, 1949).

MITCHELL, J. B.: *Historical Geography* (English Universities Press, 1954).

SMAILES, A. E.: *The Geography of Towns* (Hutchinson, 1953).

SMITH, J. RUSSELL, and PHILLIPS, M. OGDEN: *Industrial and Commercial Geography* (Constable, 1946).

UNSTEAD, J. F.: *A World Survey from the Human Aspect* (University of London Press, 1948).

See also book-list for Topic III, p. 151.

(*C*) EXAMPLES OF BOOKS AND ARTICLES CONCERNED WITH IMPORTANT PROBLEMS OF GEOGRAPHICAL INTEREST

FLEURE, H. J.: *The Geographical Background of Modern Problems* (Longmans, 1932).

MACKINDER, SIR H. J.: *Democratic Ideals and Reality* (Holt, N.Y., 1942).

WEIGERT, H. W., and STEFANSSON, V.: *Compass of the World. A Symposium on Political Geography* (Harrap, 1946).
—— *New Compass of the World* (Harrap, 1949).
Food and Agriculture Organization of the United Nations (Report of the Preparatory Commission on World Food Proposals) (H.M. Stationery Office, 1947).
EAST, GORDON: *Mediterranean Problems* (Nelson, 1940).
KEESING, F. M.: *The South Seas in the Modern World* (Allen and Unwin, 1942).
PELZER, KARL J.: *Pioneer Settlement in the Asiatic Tropics* (American Geographical Society. Special Publication No. 29).
MAIR, L. P.: *An African People in the Twentieth Century* (Routledge, 1934).
TOTHILL, J. D. (Ed.): *Agriculture in the Sudan* (Oxford University Press, 1948).
MATHESON, J. K., and BOVILL, E. W.: *East African Agriculture* (Oxford University Press, 1950).
RICHARDS, A. I.: *Land, Labour, and Diet in Northern Rhodesia* (Oxford University Press, 1939).
FORDE, C. D., and SCOTT, R.: *The Economics of a Tropical Dependency*, vol. i: *The Native Economics of Nigeria* (Faber, 1946).
HALL, SIR A. DANIEL: *The Improvement of Native Agriculture in relation to Population and Public Health* (Oxford University Press, 1936).
WADHAM, S. M., and WOOD, G. L. (Institute of Pacific Relations): *Land Utilization in Australia* (Melbourne University Press, in association with the Oxford University Press, 1939).
JACKS, G. V., and WHYTE, R. O.: *The Rape of the Earth: a World Survey of Soil Erosion* (Faber, 1939).
DINGWALL, E. J.: *Racial Pride and Prejudice* (Watts, 1946).
UNESCO.: *Fundamental Education. Common Ground for All Peoples.* (H.M. Stationery Office, 1947).
DRIBERG, J. H.: *At Home with the Savage* (Routledge, 1932).
STAMP, L. D.: *The Land of Britain—Its Use and Misuse* (Longman, 1950).
STAMP, L. D.: *Our Undeveloped World* (Faber, 1953).
GOUROU, PIERRE: *The Tropical World: Its Social and Economic Conditions and Its Future Status*. Tr. E. D. Laborde (Longmans, 1953).
RUSSELL, SIR JOHN: *World Population and World Food Supplies* (Allen and Unwin, 1954).

A number of books on political, social, economic, and colonial problems are published by the Royal Institute of International Affairs, or for this Institute by the Oxford University Press.

CHAPTER II

PRELIMINARY CONSIDERATIONS CONCERNING THE TEACHING OF GEOGRAPHY TO CHILDREN UP TO THE AGE OF ABOUT TWELVE YEARS

In most 'progressive' junior schools the geography that children learn, and the geographical experiences they gather, are part of the work done in pursuit of topics or activities that come naturally to the children and hold meaning for them—which the name of a subject does not.[1] Yet these facts do not make it unnecessary for the teacher to consider the nature and possibilities of the children's work from the point of view of the subject. Teachers who understand them know that junior-school children frequently seek to delve deeply and widely into geographical subject matter. The children's desire to investigate their immediate world, their delight in true stories of travel and adventure, and the questions these arouse, are but a few obvious examples. It is therefore assumed that teachers are aware of the importance of 'things geographical' for junior-school children; that teachers can see and use the opportunities offered, when, in pursuing a topic of general interest, part of the work done by the children is of value or significance geographically, although only the teacher, or the geographically minded onlooker, may perceive this to be so. Throughout this book the terms *subject* and *geography* are used with these facts in mind.

In this chapter an attempt is made to consider the following three essentials:

(i) The capacities, interests, and other attributes of the *children* likely to affect the nature and possibilities of their geographical work.

[1] By the age of ten intelligent children seem quite ready to distinguish 'what *geography* is about,' and teachers may be unnecessarily timid if they refrain from using the term with them. This does not mean that geography is then to be taught as an isolated subject.

(ii) The *results* to be achieved—*i.e.*, the nature and amount of the geography that a child of eleven to twelve may reasonably be expected to know and understand.

(iii) The *methods* of approach that are most suitable—educationally, for the children, and geographically, for the subject, although it is not taught as such.

In order to consider these essentials it seems necessary to attempt to separate them as indicated above, but it is impossible to deal with one completely in isolation from the others, and a certain amount of repetition is difficult to avoid. This fact in itself is interesting, since it indicates that in fulfilling the requirements of one essential those of another are also satisfied. Indeed, it is a matter of no small significance that the type of geographical study which most truly meets the children's interests and needs is, when viewed in the right perspective, the most faithful to the subject.[1]

I. The Children: their Capacities, Interests, etc., in relation to Work in Geography

Three lines of inquiry stand out as being particularly relevant. They concern: (*a*) the *intellectual development*, (*b*) the *attainments*, (*c*) the *interests*, commonly found among children at all stages in the years of school life under consideration—*i.e.*, from the age of about five or six to twelve years and beyond.

(*a*) Intellectual Development

A variety of intellectual gifts are needed for the learning of geography, and different parts or aspects of the subject require different mental powers. We do not yet know how far these powers are possessed by children at different mental ages, though it is clear that, while some of the gifts are acquired only in late adolescence, others are well devel-

[1] Compare the first two paragraphs on p. 30 with the second on p. 42.

oped in children of junior-school age, and should be used then. It seems best to deal with some of them briefly under the headings *imagination* and *reasoning*.

Imagination.[1] One important characteristic of childish imagination is that to which attention is called by Professor Cyril Burt:[2]

> During the later stages of primary education (eight to eleven) the majority of the pupils appear to be visualizers. They imagine things with the mind's eye. If the teacher could penetrate into the consciousness of such a child he would find the child's thoughts unrolling themselves before him, rather like a cinematograph film. . . . What is presented or suggested to the child of this age, then, should be presented or suggested in concrete, pictorial, and visible form. Towards adolescence there seems no doubt that the power, or at any rate the habit, of visualization tends to diminish; and the more intelligent children tend to think in terms of words rather than in terms of concrete images. . . .
>
> The teacher who deals with boys or girls of eight or nine must bear constantly in mind that while he himself finds it easy to think in verbal terms, they require rather to think in terms of concrete things and of visual images.

This truth is of very great importance in geographical teaching. Older children and adults are too easily satisfied with the use of verbal symbols. For example, they are frequently unaware of the fact that its name is almost all they really know of a given place, and they remain quite content to talk of these mere names with confidence in every-day life. Yet primary-school children often show by the nature of their questions how keenly they desire to gain visual images that are detailed, exact, and complete. Attention should be given to the forming of visual images in the years when children do so with readiness, so that they not only acquire a valuable store of them, but are encouraged to

[1] For examples which illustrate the application of points mentioned here see Chapter VII and p. 132 and pp. 297–298.

[2] *Report of the Consultative Committee on the Primary School*, Appendix III (H.M. Stationery Office, 1931).

feel the need for them. Too often in the past school-teaching has starved the child' hunger for visual images, and this may help to explain why in many cases it becomes weaker than probably it need as he grows older.

Nevertheless, while recognizing the fact that during childhood the imagination is often more powerful than in later life, teachers need to exercise a certain amount of caution. Quite young children can create lifelike pictures in their minds, provided that the subject is not too complicated, and that the pictures are built up of images of things already familiar. But when the subjects to be visualized are quite unfamiliar a young child's mind, though ready and quick to use imagination, is not supplied with sufficient tools and materials (in the form of ideas gained from experience), standards or scales whereby to estimate, and controls (in the form of acquaintance with possibilities) whereby to limit proportions, etc. Before experience makes it possible to check the imagination it is capable of wild flights beyond the bounds of possibility, though the child himself be not aware of the untruthfulness of his mental pictures. Such flights may be allowed, or even welcomed, in connexion with the work of some other school subjects, but if the work is to be geography it must aim at creating images which are true to reality.

A description of a strange land that has few points of resemblance to our own (*e.g.*, the Gold Coast) calls for an exercise of constructive imagination beyond the powers of most children younger than about nine years, unless they have travelled recently in a similar region, or through some other means possess the requisite ideas and impressions based on experience. A few of the images that go to make up the mental pictures may, with the help of illustrations, be correct in themselves, but they are liable to be placed in a wrong setting, and so rendered valueless, partly because in thinking of one fact children lose sight of others, partly because the children's own environment is 'too much with' them. In order to use children's capacity for imagination as fully as possible, and at the same time to be sure that its

creations are within the bounds of possibility, teachers must endeavour to enrich the children's background of experience by school journeys, observational work, etc., and by all other forms of illustration in its widest sense.

The same characteristic of children's thought reveals itself in another way. It is a commonplace that children of nine, ten, and eleven can often 'see' a fact in the mind's eye, but are quite at a loss if required to put it into words. For this reason children should be allowed to express their knowledge in concrete ways—by drawing pictures, making things, etc. Yet at the same time they often show pleasure when an understanding adult puts the facts into words for them, and a certain number will criticize and improve on a statement that is offered. Geography offers an untold wealth of topics which children at this age delight to 'make their own,' and therefore it provides many an opportunity for the training in verbal expression that has to be given by the age of eleven. Yet more scope for pictorial expression should be allowed than is often the case. The delight with which children greet the suggestion to 'draw a picture of it' is surely an indication of this. (The children's tendency to visualize may actually become a pitfall for the teacher. *Cf.* the examples on p. 182 and p. 240.)

Reasoning.[1] No hard-and-fast statements can be made about children's reasoning capacity, partly because this is a subject in which there is need for much research, and partly on account of the wide variation in reasoning-powers between different children of the same age. Nevertheless it is possible to outline in a general way the stages through which children's ability to reason and their interest in reasoning seem to develop from babyhood onward.

In children younger than seven years there is an ability to perceive the more obvious relationships between objects, events, or conditions and their immediate associations of cause or result. This is only true of what Piaget calls "the world of reality." In "the world of play," which may

[1] For examples which illustrate the application of points mentioned here see pp. 41–42, 141–142, and 193–194, and Chapter IX

be equally real to a child up to the age of seven to eight years, true scientific reasoning, even in a rudimentary form, is often entirely absent.

Between the ages of seven and eleven, sometimes considerably earlier, children begin to reason with greater penetration about cause and effect concerning things they really know. Anything in the nature of scientific inquiry should be encouraged as it arises or occasion offers; but it should be inquiry that comes from the children, and will therefore be related generally to subjects familiar or real to the children. Otherwise it is apt to be the teacher's, not the children's, inquiry.

Only from the age of eleven to twelve do most children *begin* to show a limited but growing capacity for more abstract reasoning. The forming of conclusions based on reasoning concerning matters beyond experience and the use of generalized statements based on conclusions, common enough in geographical text-books, are not for the child younger than at least twelve years as a rule.

Probably the wisest plan is to wait until the demand for reasoning comes from the children themselves. On such occasions the teacher should endeavour to ascertain whether the child's questions really indicate a need and a capacity for the reasoning which those questions suggest to the adult mind. A young child's question may have a significance quite different from that of an apparently identical question in the mouth of an adult, or even of an older child. A very little child's "Why?" may often mean "How?" or merely "Tell me more about it." With children younger than seven years, at least, "Why?" does not necessarily indicate ability, nor even desire, to relate ultimate cause to effect, and a child is often satisfied with an answer that does not give what an adult calls 'reasons.' Children of seven to nine when studying pictures ask many questions, but the majority seem to mean "What?" rather than "Why?" There can be no doubt about the intense curiosity revealed by children of this age concerning all manner of things, but this curiosity is applied to immediate actualities—things as they appear

or behave. It does not seek for full (and therefore remote) reasons, nor for ultimate causes, as a general rule. From about nine years onward the desire for fuller reasons as to cause and effect begins to show itself more clearly and to develop, so that by the age of about eleven many children become genuinely anxious to find out the answers to the most penetrating of questions in connexion with subjects hitherto unfamiliar, but in which their interest has been aroused.

A class of children aged nine and a half to ten and a half recently plied their teacher with questions about matters to do with climate: "Why is it so cold on a mountain-top that snow will stay there always?" "Why is summer warmer than winter?" "Why is it always hot near the equator and cold near the poles?" With the help of simple diagrams answers were worked out, so far as the children's capacity allowed, in subsequent lessons, and, incidentally, many more questions were raised. Towards the end the adult mind of the teacher was interested to see that the work dealt with the three fundamentals—the variation of temperature according to (*a*) height (altitude), (*b*) time (seasons), and (*c*) position in latitude. She attempted to point this out, but it fell on deaf ears. The children had been enthusiastic when dealing with concrete ideas even in advance of their years, but abstractions and generalizations meant nothing to them.

School geography is rich in opportunities for 'teaching children to think.' The danger lies in the possibility of imposing the 'thinking' prematurely, even when it is apparently drawn from the child by question-and-answer methods. A chain of reasoning, a generalization, an abstraction, may fascinate an adult, and the reasoning which makes a geographical study interesting to himself may blind the teacher to its remoteness from the child's interest and capacity. Meaningless 'labels,' phrases but half understood, the parrot-knowledge with which many children leave school, may be traced, in part at least, to the teaching of enthusiasts who have not gained a sufficient contact with their pupils' minds.

To summarize the above (pp. 25–29): With children younger than eleven years geographical teaching (or study) should give descriptions, graphic and concrete impressions; the work should deal with 'things as they are,' considered for their own sake and for the interest which they hold.

Only after the age of eleven to twelve is there much development of such powers as analysis, of generalizing, of considering one fact in relation to several others, of making one's own conclusions with sufficient caution. Therefore if the more systematized 'text-book' geography is to be the children's own it cannot be approached until after this age (see pp. 41–42).

(*b*) **Attainments**

Like all the more academic subjects, geography can be learned by the most appropriate methods only when a child is in possession of certain attainments, some scholastic, such as fluency in reading; some physical, such as ability to walk considerable distances. As soon as he can walk a mile or two without fatigue a child has a wealth of geographical raw material literally at his feet, if he lives in a country district, and generally also if he lives in a town. Before he can walk far—*e.g.*, before about eight years—a child is actively engaged in the investigation of his surroundings within a more limited area, but, if he is allowed full scope, with great thoroughness. In many of his ordinary games and plays he is acquiring ideas of geographical value. But that which the world recognizes as geography cannot begin until a child can use maps and read books.

Fluency in reading is achieved by some children much earlier than others. Generally the mechanical difficulties are not mastered sufficiently to allow every child in an average class to 'read for meaning' easily until about the age of eight years, and then only with specially prepared children's books. Many children can, and do, read the simplest geography-books easily at the age of seven. From about the age of nine years reading capacity generally seems to be sufficient to allow all but exceptionally backward children

to read anything they are likely to be able to understand. This fact has an important bearing on choice of subject-matter and methods for children younger and older than nine years.[1] It might be pointed out here that learning to read often takes on a new interest when a child discovers that certain books tell him thrilling things about strange places or true adventure-stories.

Other attainments, such as facility in expressing ideas in writing and drawing, are helpful and valuable, but cannot be regarded as essentials. There is, however, one other qualification which a child must possess before he can study geography as a "geographer." He must be able to use maps with understanding—the understanding of a geographer—albeit in a rudimentary form. Ability to begin to use atlas-maps cannot be assumed until the age of about nine to ten years as a general rule.[2]

These considerations suggest that the study of what is usually meant by 'geography' cannot begin until the age of about eight to nine years at the earliest, and probably not till nine plus.

(c) Interests

Most normal children show curiosity concerning practically any phenomena that come their way. With young children this curiosity is applied to everyday things and happenings in the home and neighbourhood, and if properly encouraged leads to simple forms of inquiry, many of which are of geographical value. As children grow older their curiosity is concerned more and more with things that are relatively new and strange; but the curiosity itself is not lessened, even though it may not be voiced quite so often, and it is still concerned more often with objects or events that have been or are being witnessed than with subjects entirely beyond the child's experience.

Children come to school full of a desire to know and to learn about all manner of things. There is no necessity for the

[1] See pp. 130–132, 289–293, and 296–299.
[2] See Chapters III and V.

teacher to hunt round for topics to interest children, for they bring quite enough with them. Yet in the past, instead of satisfying a young child's hunger for knowledge concerning, for example, "what the men are doing in the hole in the road," etc., etc., a new subject is presented to him about which the teacher knows something (admittedly a very little)—"Children in Other Lands"! The child may be interested in this up to a point—he is interested in almost everything that comes his way (if it is to some extent within his grasp), and especially in stories. But his curiosity concerning the real things about which he wanted to know remains to be satisfied, if at all, outside school, which is a twofold pity: (*a*) because his interest in his own topic would enable him to attack its investigation with vigour and concentration, and lead him to pursue it for a considerable distance by his own effort, and (*b*) because some, at least, of his own topics offer wider and truer fields for studies of geographical and educational value than such topics as "Children in Other Lands," at least at the age of six! [1]

The child's interest in home, neighbourhood, and his own experiences farther afield—*e.g.*, on holidays—continues throughout school life, and can be utilized in many ways. But alongside with it from the age of about seven to eight he is developing an interest in things that are strange, even beyond his experience, combined with an increasing ability to imagine them and accept them in the "world of reality." By about nine to ten years this interest and capacity has grown considerably, and the children are not only keen to hear and to read true stories of adventure, but able to understand them as actualities, to 'see' them with visual images that are more or less correct. The interest in travellers' tales generally increases as the children grow older, and it both adds to and thrives on the growth of geographical knowledge with which it is inevitably connected. It should be used to the full by teachers, but not before the child has an adequate background of experience, and not before his imagination is sufficiently disciplined. At first the travellers' stories

[1] See Chapter XII.

should be carefully chosen with this fact in mind, but later, at the ages of about ten to twelve, there is more capacity for a wider range of subject-matter and for a fuller investigation of details connected with stories.

It is impossible to make many generalized statements about subjects in which children are interested, for naturally there must always be variation according to a child's individual tastes, and also according to the type of environment in which he lives. Among the most common interests that lead directly to studies of a geographical character are: the interest of all children in animals; of boys in 'things that work,' vehicles of all kinds—lorries, trains, ships, aircraft, etc.[1]; of girls in homes and houses and family life. All children between the ages of seven and eleven are generally keenly interested in making things and also in collecting things.

Throughout the junior stages, perhaps most notably between the ages of seven and nine, children take delight in learning and using new words—provided these stand for ideas that have become realities for them. Full use should be made of this in extending the vocabulary, though it must be emphasized that the experiences (or new knowledge) come first; the words follow when the need is felt for them.

Before we leave this brief consideration of *the children* in relation to geography experienced teachers will perhaps pardon the inclusion of one additional point which is often overlooked by beginners. No class is ever made up of individuals of the same interests, the same attainments, the same capacity for imagining and understanding. Often no two children in a class are at what is sometimes called 'the same stage.' It is difficult to avoid in some circumstances

[1] The progress of science is changing our everyday environment so rapidly that some of the interests of children are changing with it. The interest in trains and railways, which seemed dominant among small boys about twenty years ago, appears to have been ousted from first place since the development of aircraft and motor transport. The geography teacher who utilizes such topics, or who makes use of the children's interest in certain types of current events (*e.g.*, a flight round the world), has need to keep abreast of the times!

catering chiefly or even exclusively for the more intelligent or more advanced children, and in others ignoring them in order to deal suitably with the slower ones. This is mentioned as a warning that needs special emphasis in connexion with geography-teaching. It is only too easy to notice and quote examples of children with exceptional gifts, interests, and powers of comprehension in this subject, or of children who possess an unusually wide background of geographical knowledge (possibly gained through travel). The teacher must be careful to see that in deciding on a piece of work suitable for one or a few he or she is not introducing to all members of the class a topic or a method of approach beyond the capacity of the majority. This applies to several aspects of geography, but probably most of all to the use of maps.[1]

II. The Result to be achieved: The Geography that a Child of Twelve can be expected to know and understand

The work of the primary school is often regarded to some extent as a preparation for that of the secondary school. In some respects this is perhaps inevitable. Nevertheless it is much more important to consider the child of seven, or nine, or eleven, for his own sake at the moment—*i.e.*, as an individual whose tastes and capacities must be respected, and who has every right to follow his own bent and to work in the way that comes naturally to him, taking no thought for the remote future. That is to say, nothing which it may be imagined by teachers or others that he *ought* to know and do should be imposed upon a child if it is out of harmony with his capacity and interests. As indicated elsewhere, if the child's powers and interests are followed, and if the teacher allows the child to pursue the lines that open naturally to him, the preparation for future geography can be sound, full, and educationally valuable. This cannot be said of the kind of 'preparation' secured

[1] See Chapters III and V.

by the senior-school teacher who demands that a child of eleven to twelve shall come up having spent his time in memorizing items of information which any properly trained child of twelve should be able to find out in a moment by reference to an atlas, text-book, or encyclopædia.

Nevertheless the secondary-school teacher has the right to demand that the child of eleven to twelve shall come possessing certain powers and abilities which he could never acquire by 'looking up,' and which he can and should possess by the age of eleven to twelve. The more important of them are indicated below. In several cases they are dealt with more fully in later chapters.

(i) **Interest** is by far the most important of the results to be achieved by geographical work in the junior school. It is scarcely true to say that school-work should *arouse* the interest, since topics which appeal strongly to children of any age are frequently geographical, or closely related to geography. When geography is taught without sufficient consideration of these interests it may fail to sustain the enthusiasm normally present among boys and girls, though, of course, all aspects of the subject do not appeal to all equally. In addition to interests which the children already possess, it is the teacher's duty to give them others. Geographical work in school should open up new channels for investigation, develop new tastes (*e.g.*, in reading and collecting, etc.), and awaken a child to the significance of many things around him that he would otherwise ignore.

By the time they reach the age of eleven children should have come to realize that geographical study is worth while, not only because it is what is sometimes called "thrilling," but because it tells them things they want to know. For example, it satisfies and encourages their growing desire to find out "How?" and "Why?", and to seek for explanations. If the children have not sustained and developed their interest at the end of the junior-school course the geography-teaching may be said to have failed in its primary aim.

(ii) **Knowledge of fact**, of a certain kind and within certain

limitations, may be expected of a child who leaves the junior school at the age of eleven. It should above all things be the kind of knowledge which children can acquire by following their own lines of investigation, some of it being gained more or less incidentally. Having worked in this way, a child of eleven may know:

(*a*) The names, shapes, and relative positions of the continents and oceans, with some clear realization of their relative sizes; a little about their major surface features—*e.g.*, where there are vast areas of level country or mountain-ranges, etc., where the greatest rivers flow (*e.g.*, the Nile, Congo, Amazon, etc.).

(*b*) The position of the most important countries in each continent and the names and position of some cities of great world importance, but not by memorizing them mechanically.

(*c*) Some facts of interest and importance concerning a few countries or regions; the life and work of their people, some characteristics of their scenery, climate, etc.

It should never be assumed that a child of eleven to twelve should know any particular item of the type of knowledge indicated under (*c*). Exactly which countries or topics have been studied does not matter very much, since none can have been dealt with in a manner that will make it unnecessary to consider them again in later school-work. The list given above does not adequately cover all the geographical information a child of eleven to twelve is likely to possess. The knowledge of subject-matter he has acquired may be full in some directions, scattered and slight in others, but it is knowledge that has proved interesting for its own sake, and it is likely to become valuable in future work as background knowledge. In fact, it will probably become part of the material from which simple conclusions can be formed, though in the junior school it has not been used in this way. The knowledge of a child of eleven years is simple and direct in character, but generally includes intimate details—the kind of things children love to find out; part of it is also in the nature of general impressions—*e.g.*, gained from stories.

(iii) **Understanding of simple terms** is probably more important for a junior school than knowledge of 'facts.' Outdoor work, in and beyond the school neighbourhood, is of great value in this connexion. For instance, eight-year-olds, exploring the course of a small stream, eagerly learned and used the terms tributary, source, mouth, bed, valley; another class, during walks beside the Thames, did likewise with the words wharf, current, lighter, cargo, ebb-tide, etc. The children felt the need of these words to express ideas that were real to them. Innumerable terms like these are needed, not only as household words in geography, but as part of a general vocabulary, and children enjoy opportunities for discovering 'new' realities *and* the names for them. This work cannot be completed in the junior school, and in secondary schools it is too often taken for granted that such simple terms are understood. (A large proportion of candidates in a recent Higher School Certificate examination used 'bed' as meaning 'valley floor' or 'flood plain.') Conceptions of features beyond experience, such as peak, range, gorge, glacier, dunes, reefs, port, harbour, oasis, lagoon, swamp, and countless others may also be gained incidentally during studies of pictures, films, and stories of travel, when, from time to time, *different* examples of a given feature may come up for discussion. In all this work the child's hunger for complete and detailed visual images, as well as his eagerness for words associated with them, should be welcomed and used.

(iv) **Establishment of standards** whereby conditions that cannot be experienced may be rightly estimated is a very important part of junior-school work in geography. The child's natural curiosity leads him to study the phenomena of his surroundings, and on the basis of knowledge thus gained he will attempt later to imagine phenomena beyond his experience. He will be required in his later work to form conceptions of distances, areas, heights, depths, degrees of heat and cold, amount of rainfall, etc., concerning all manner of places or regions. In order to do so accurately and as easily as possible he must be equipped with a series of

suitable 'standards.' The child's interest in the investigation of his surroundings provides many opportunities for acquiring and fixing these standards during the junior-school work. For example, he should learn just how long is 100 yards, ¼ mile, 1 mile, 10 miles, etc., how large is 1 square mile (by reference to familiar landmarks, and if possible by actually going over the ground). He should find out how great is the amount of rise along a well-known slope or hill; what are the hottest temperatures on warm summer days; what is the temperature when the room is just comfortably warm, and also on various occasions when it feels much too cold; how much rain fell in a certain heavy shower or on a given rainy day, in a particular month, in a year, etc. The possession of standards of this kind will ensure a greater capacity for 'imagining accurately' in geographical work to follow. To encourage the use of them is to encourage precision of thought and statement.

(v) **Some Understanding and Facility in the Use of Maps, an Atlas, and the Globe.** These are to a large extent important tools and materials for geographical study. They cannot be used with full understanding by the light of nature, and a great many misconceptions, vaguenesses, or difficulties in later geography are definitely traceable to unenlightened teaching in this respect, generally because children have been expected to use maps and globes before they have sufficient understanding of them. It is both necessary and possible for the junior-school work to include an adequate preparation in this direction, so that the children enter the secondary school equipped with what may be called essential 'tool knowledge' for the study of geography.[1]

III. Methods of Approach or Attack

(*a*) Educational Method

Three sentences written nearly forty years ago by a well-known geographer[2] who was also an inspiring teacher

[1] See Chapters III and V. [2] Professor L. W. Lyde.

of geography summarize or imply much of what is best in modern educational ideas :

> The important thing is that the method should be educational, not what is called 'scientific' [*i.e.*, should be developed from the child's point of view, not from that of the mature scientist, in cases where there is a difference between them].
>
> The vital concern is for the child, not for the subject.
>
> The teacher's work is to save him [*i.e.*, the child] from wasting his time, not from making his effort.

Up-to-date methods in education are characterized by an insistence on the activity of the children. The emphasis is on the *child* who *attacks* the work. The teacher's task is as much in the nature of guiding or following as 'teaching' or leading.

Another point emphasized by modern educators is the absence of clear distinction between subjects in the work of children before the age of about ten to eleven. Children's interests lead them to pursue *topics*—*e.g.*, railways, aeroplanes, shops and shopping, building houses, bridges, etc., and innumerable others—*i.e.*, not *subjects* as they usually appear in a school curriculum—*e.g.*, arithmetic, geography, and handwork. The teacher perceives a value in the work from a mathematical, geographical, or other 'subject' point of view ; but to the child or even the unenlightened onlooker the work may not appear as 'mathematics,' 'geography,' etc. Nevertheless work that is of great value to these subjects may be carried out in such circumstances.[1] For this and other reasons it is often impossible to consider the geographical work of junior-school children in isolation from other work that is not primarily geographical.

All these ideals can and should be followed in geographical teaching, but without being either contradictory or reactionary it is possible to recognize the fact that there are dangers or weaknesses in pursuing them beyond a certain limit. Geography is undoubtedly a subject which allows the 'attack' to be made by the children. It is closely related to many of their natural interests, offering much that they can make their own, pursuing it because they find it

[1] See Chapters XII and XIV.

attractive and worth while. These very facts may become a pitfall to the young teacher enthusiastic for modern methods.

Every one concerned—parent, teacher, and child—has a right to demand that a child shall acquire the knowledge, understanding, and skill that he will need later on (not merely in geography, nor *only* in school-work of any kind), and that he shall acquire these things when he is capable of doing so easily and naturally. That is at least part of the purpose for which he comes to school. However 'modern' the methods may be, it is the business of the teacher to see that the children gain these essentials in an appropriate manner and at a suitable time. To the child himself the acquisition of such understanding or skill is often merely incidental or even unconscious.

This insistence on the gaining of tool knowledge in the junior school is of importance to-day in view of the increasing use of the newer educational methods—'project,' 'activity,' methods, 'centres of interest,' etc. To follow schemes whereby children are expected to pursue their own lines of inquiry demands that the children shall find no hindrance either through lack of necessary 'tools' or through inability to use them properly. For example, a child should not embark on a piece of work which necessitates looking up places in an atlas if he has no understanding of the relation which the maps in the atlas bear to the reality they represent. It may be answered that he can 'learn by doing'—*i.e.*, find out how to use a map by using it. In this case such a theory is open to considerable doubt for two reasons: (*a*) It would take an excessive amount of time to do so at the moment if the resultant understanding of maps were to be satisfactory *and* assuming this to be possible; (*b*) a method which allows unenlightened use of maps of the world may lead to serious misconceptions, particularly in the minds of children who are not above average in intelligence. This was realized by educators of a generation ago.

It is therefore necessary for the teacher to find means by which the children can acquire this tool knowledge in a way that is educationally satisfactory—*i.e.*, which allows the

children to pursue the work at an age when their interests and capacities lead them to do so readily.

(*b*) Geographical Method

There is also a need to consider what might be called the method of the subject, and to decide how far this is suitable for the children in the light of educational method.

It is possible to recognize two main geographical methods used in text-books:

(i) Until recently the description of a continent or country in most school geography-books followed a definite sequence —position, relief, climate, natural vegetation, products, etc. It was considered necessary to deal with human activities—*e.g.*, occupations, industries, trade—only after the factors which determined the nature of these activities were known. Therefore position, climate, etc., were dealt with first. In the same way it was thought necessary to consider climate before vegetation, relief before climate. This method is essentially logical, and for that reason alone is appropriate for use only with older pupils who have enough knowledge to see its value and to feel the need for it, as well as the mental gifts referred to previously. It is not a method to be thrust upon children who are still at the stage of collecting and sorting their information. Yet the children's interest in seeking for reasons provides invaluable opportunities for a teacher attempting to prepare the way for the logical method. One recent text-book on the British Isles *begins* by discussing the trade of the country. The student might take a simpler example and work out in reverse sequence the essential geographical characteristics of, for example, Norway and Sweden by tracing the geographical explanation of the nature of the trade of those countries (as given in *The Statesman's Year-book*).

(ii) More recently geographical studies have been characterized by the use of the *regional* method, the division of an area large or small into 'natural regions.' This method is probably in some respects even more remote from the

children, although the fact is less obvious. A natural region is not often clearly defined in nature. Regions of desert and of savanna may not be much more extensive than the transition area between them, through which it may be necessary to draw a boundary-*line*. Moreover, within any one region there is usually great diversity. The advanced student of geography realizes this, and regards the 'natural region' as a useful abstraction. Children, on the other hand, take it too literally, as do many students. It would probably be best if the natural region were kept in the background until the children are able to see the arbitrary nature of many types of natural region and the extreme difficulties in the way of distinguishing and delimiting them. The children should have progressed far enough in the subject to feel the need for classification in geography, which the use of natural regions may satisfy. For the sake of orderliness and system teachers should, no doubt, work with the regional idea in their minds, but since it is a conception to be appreciated only by a relatively mature mind it should be approached through concrete examples when suitable opportunities offer themselves. These may occur in local observational work—say, in plant ecology, or by a study such as that illustrated in Fig. 7 (p. 64).

In any case a system of natural regions can be worked out only by a geographer who possesses a full store of detailed descriptive knowledge. This suggests that, from the point of view of the subject, school geography should begin not with generalized accounts of regions, but with detailed descriptive studies of more limited topics.

To cover a given piece of ground more or less within a given space of time requires the formation of a scheme of work. It seldom happens that one can keep rigidly to any previously made plan in teaching children. Nevertheless there should be a simple thread or sequence connecting the steps together in the mind of the teacher, and so far as is possible this line of development should become clear to the children. Every child is glad to see how

his work is evolving, to realize progress made, and to be aware of the end in view. The studies or activities should be worked out by every teacher independently, not once and for all, but for, and *with*, every group of children with whom the teacher has to deal.

Classes as well as individuals differ remarkably in their attitude, reactions, interests, and capacities. This fact alone makes it impossible to put forward a scheme of work as definitely suitable for *any* children of a given age in *any* type of school. Nevertheless it is easier, and probably clearer, to illustrate the working out of geographical and educational principles by giving in some of the chapters that follow a certain amount of detail concerning courses of work, rather than to present the same principles in any other way.

Many other questions concerning methods, in general and in detail, are considered in the chapters that follow. In this chapter an attempt has been made merely to collect together and to set down briefly most of the principles that will be developed and applied elsewhere.

SUGGESTIONS FOR READING

Scottish Educational Department: *Primary Education.* A Report of the Advisory Council on Education in Scotland (H.M. Stationery Office, 1946).

Report of the Consultative Committee on the Primary School (H.M. Stationery Office, 1931).

Report of the Consultative Committee on the Education of the Adolescent (H.M. Stationery Office, 1926).

DEWEY, J.: *How We Think* (Harrap, 1933).

—— *The School and Society* (University of Chicago Press, 1915).

—— *The School and the Child*, edited by J. J. Findlay (Blackie).

HOCKET, MRS E. MANNING (ed.): *Teacher's Guide to Child Development* (California State Department of Education, 1930).

ISAACS, S.: *Intellectual Growth in Young Children* (Routledge, 1930).

LORIMER, F.: *The Growth of Reason*, Chapter V (Routledge, 1929).

NUNN, SIR T. P.: *Education: Its Data and First Principles* (Edward Arnold, 1945).

PIAGET, J.: *Judgment and Reasoning in the Child* (Routledge, 1924).

—— *The Child's Conception of the World* (Routledge, 1929).

See also books in list (*A*), on pp. 20–21.

CHAPTER III

FIRST STEPS IN THE USE OF MAPS AND RELATED WORK FOR CHILDREN BETWEEN THE AGES OF ABOUT SEVEN AND A HALF AND NINE YEARS

By means of maps the geographer expresses a large part of his knowledge most accurately and completely, and at the same time most clearly and simply. Maps are also to a certain extent his raw material, his sources of information. Not only for geographical work, but for intelligent life in the world, an educated person should be able to recognize and appreciate the facts that a map conveys, reading a map as easily as he reads a book, without consciousness of the reading process.

A child should learn to read maps correctly as early as possible. Other school subjects besides geography require them (history, scripture, etc.). Also he meets maps in his daily life outside school—motoring maps used by older members of the family, maps posted in public places, etc.—and, what is more important, his interest in these maps is often keenly aroused at a very early age. One of the arguments generally put forward by those who would advocate the use of maps by children who are, in the opinion of most educators and geographers, too young for it is this: "The children are so keenly interested in them," even at the age of six. This is sometimes true, but only in exceptional cases with children so young, and the interest is not there as a result of understanding, but rather of curiosity, except when the child has discovered and understood some large-scale topographical or cadastral maps of places that he knows.

A child's interest in maps should be allowed full scope and receive every encouragement, but never should it be assumed that at the age of six, seven, or eight years a child can use maps to work with simply because he is interested in them; much less a *class* of children, who are not all equally

interested. It is, of course, possible to train or encourage a child of seven or even six years to talk glibly about countries and places, pointing them out on map or globe, as many an older person does, with no larger or truer conception in his mind than that of the patchwork on the paper or the coloured ball which he grasps in his hands. An average child of seven cannot as yet realize the extent to which these things are only symbolic. He cannot be expected to form an adequate conception of the relation which they bear to the reality. Therefore all the time his mind is fixing and retaining impressions which are grotesque and untrue, and which by their very clearness in his mind, as well as because they are being fixed so early in life, will be difficult, if not impossible, to correct in later geographical work.

Much of what is implied here will be made clearer in Chapter V, but one example needs special emphasis. The most familiar result of premature or unintelligent use of wall-maps or globes is the difficulty which the majority of people have in eliminating the confusion of 'top' and 'bottom' with 'north' and 'south' and 'up' and 'down' with 'northward' and 'southward.' [1] If this misconception has once crept in even an intelligent child finds it far from easy to clear it from his mind; yet children of average capacity who have approached the subject in the right way from the beginning do not as a rule make the mistake at all.

A world map, or even a continental map, is so much conventionalized and distorted that it is difficult even for an adult to 'see through' it to the reality that it represents. We need to know something of the meaning of scale, the cardinal points, orientation, latitude and longitude, map projections, and other matters before we can appreciate what the atlas-map is, and what it stands for. Of course, children have to begin using atlas-maps before they fully understand them. 'Map-sense' must be developed, like many other things, through use and experience. It is of the highest importance that the teacher should bear this in mind, and that the work of children throughout the school should be so directed that

[1] *Cf.* J. Fairgrieve, *op. cit.*, pp. 28–31.

their understanding of maps and facility in using them is developed at every opportunity, and is not taken for granted.

No geographer studies or makes a map for the sake of doing so, as an end in itself. He uses it for a purpose, in relation to some actuality. From the beginning children should do likewise, never 'learning' maps as such. The need for maps should arise, as it does with the geographer, out of or as part of a wider interest that is being pursued. In the account that follows this is assumed, and the steps in map-making are considered for their own sake.

It is also important that no work with maps should begin until the children have reached the age when an understanding of (and interest in) large-scale maps comes readily and naturally. Under ordinary conditions this seldom occurs before the age of about seven to seven and a half years, sometimes later. (With large classes it is probably advisable to postpone the work until the children are eight years of age, and older still if they are below average in intelligence or capacity.) If a beginning is made at the right moment and in a manner that allows the pupil to *work things out for himself* in the right way, then with a certain amount of guidance he should be able to arrive by natural and easy stages at a full realization of the meaning and attributes of maps. The word 'natural' is used intentionally, since their work proves that it comes *naturally* to children to make and to understand maps of places they know. A child's first steps in map-work should be the expression in the form of a map of his own knowledge concerning the district with which he is familiar.

Preliminary Steps

With slow or backward children it is sometimes advisable to begin with a step that makes clear to every member of the class the relation which the plan of an object bears to the object itself. The simplest and most obvious plan is that made by drawing round the base of an object as it stands. (Only objects that stand on a definite base and have one

normal position, such as boxes or pots, are suitable.) By making plans in this way, together with pictures of the same things, it does not take a child long to realize that a plan (or map) shows *the horizontal space occupied* by a given object, on table, floor, or ground, while a picture shows what the same object looks like—a very different thing. These two facts are fundamental. Careful teaching at this stage should prevent the development of the idea that a map shows "what you see when you look down on a thing from above." Sooner or later the problem arises as to how a plan can be made of an object that is too large to fit on a piece of paper, or on a blackboard (placed horizontally). The children are quick to suggest "drawing it smaller"—*i.e.*, using the idea of scale.

To use the map of the classroom as a first step in the approach to maps is a time-honoured method that still has much to recommend it, particularly with large classes. Yet with smaller classes, especially in a quiet neighbourhood, the preliminary understanding that it gives, and more, can be gained by children using copies of a fragment of the 25-inch map[1] out of doors—as a first step. This is one of those pieces of teaching in which a direct introduction to 'the real thing' may be the easiest way. The children's very first step in the use of maps is in this case to go out, like real geographers, with the map in their hands, and relate it to the area it represents—the tiny piece of country around the school. They discover how truly, and by what means, the map shows facts that they know, and perhaps reveals some that they did not.

Other methods are also possible. For example, children aged about eight, in a village school, made their first map during a walk round part of the village. A light blackboard was carried, laid on the ground at suitable points, and a rough map drawn upon it. Needless to say, at every halt the 'map' had to be laid 'the right way'[2] before the children marked in, for example, a curve of the road, a footpath, a

[1] For information as to sources of maps see pp 74–75.
[2] See p. 49.

house, the space where the allotments were, etc. The next step was for them to study copies of a correct map of the village (scale, 25 inches to 1 mile). The same children, a few weeks later, drew in chalk on the floor of their classroom a 'map' showing the way to other villages and to two towns, three and four miles away, in different directions. This 'map,' drawn 'out of their heads,' and not, of course, to any kind of scale, extended over most of the classroom floor. The observer was surprised at the knowledge of their own district which these children quite obviously carried in their minds. Their readiness to express it in map form was only one of innumerable instances which indicate that at this age the use of the map form as a means of expression comes readily to many children, particularly to boys. These children, of whom many were not older than seven, then wanted a correct version of the 'map' they had drawn on the floor.

During the same period the same teacher carried out a similar piece of work with children whose average age was about nine, in another village school. These children enjoyed using correct maps, but did not show the same ability and zest in making their own. Various reasons may explain this; but the instance is one of many which suggest that the optimum age for introducing the map form as a means of expression (of a child's knowledge of his surroundings) is younger than nine years.

Many teachers prefer the slower and, with large classes, easier method of beginning with the plan of the classroom, before passing on to outdoor work with maps of the neighbourhood, *which in any case should follow it.* Whatever the first steps may be, certain technicalities should be understood as a result of them. It is easiest here to point these out in connexion with the plan of the classroom and the work that should accompany and follow it.

The classroom is often chosen because the whole area to be mapped is in sight, and is equally familiar to all. The problems that arise in making this plan are those connected with the representation of the *space relationship* of one

object to another. *Relative size* (horizontally), *distance*, and *direction* of all important pieces of furniture have to be considered. A *regional* distinction comes in when the part of the room filled with desks is differentiated from that which is clear. The classroom plan is indeed a map. It must even be orientated.

Orientation

Every normal human being, either child or adult, who is sketching a rough plan of things he can see draws the plan in correct orientation, without thinking about it.[1] That is to say, he draws the plan as he sees the reality at the moment, making the top of his paper show what is directly in front of him, but farthest away. Things to the left are marked on the left-hand side of the paper, and so on. It follows that the north of the plan is naturally placed towards true north, but this is not towards the top of the paper unless the child happens to be sitting facing north. (As yet, of course, the child has probably no clear knowledge of the meaning of north, east, etc.) In view of these facts it is important that any preliminary blackboard demonstrations, preferably worked out by children themselves, should be made on a blackboard that is placed horizontally (*e.g.*, on the floor or on a low platform), with the children grouped round it on all sides. A plan drawn in correct orientation is the 'right way up' for every child, no matter how he happens to be placed in relation to the horizontal blackboard. If and when it is necessary for the blackboard to be placed vertically on the easel care should be taken that the plan is drawn as nearly in true orientation as is possible in a vertical position. The children should realize that it is not correct, but convenient, to place a map vertically.

[1] The need for orientation is felt by most people when finding the way by map, for example, during a car ride in an unfamiliar area. The task is far easier when the map is set 'the right way.' When the car takes a corner we 'turn the map round.' But this means we keep the map the same way in relation to the countryside. Only the car has turned

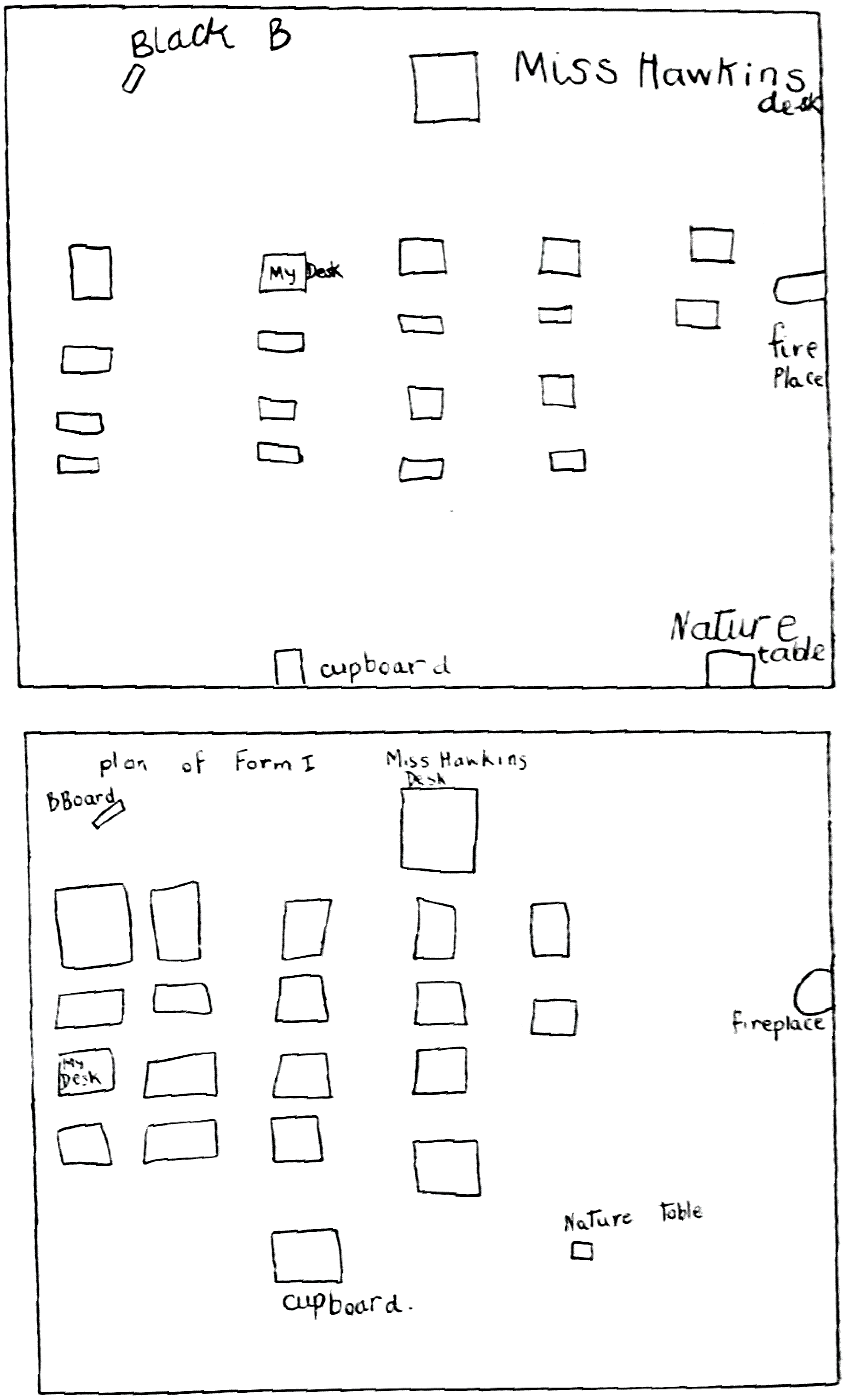


FIG. I. EXAMPLES OF CHILDREN'S FIRST ATTEMPTS AT PLAN-SKETCHING (REDUCED TO ABOUT $\frac{2}{5}$ SIZE OF ORIGINALS)

Showing difficulties experienced in spacing the various objects, both in relation to one another and to the room as a whole. Comparative study of their own work leads the children to realize the need for measurement and for the use of scale. These examples were drawn by members of the same class, aged seven to seven and a half years (Lytton House, Putney High School).

Proportion, Space Relationships, Map-reading

There is little to be gained by attempting to draw this plan accurately to scale, and often much to lose. If they are allowed sufficient time, freedom, and paper to experiment and 'begin again' children of eight years, and often younger, will arrive at quite satisfactory proportional maps. It is to be expected that objects will be wrongly spaced in the first attempts, and part of the geographical value of the activity lies in the observation and thought required to get the spacing right (see Fig. 1). At first children are usually content with plans that are approximately proportional, but ultimately they realize the need for accurate measurement although they cannot themselves draw to scale. Nothing that requires much arithmetic should be attempted. A child has proved that he understands how a room can be represented in the form of a plan if he can draw a plan of any room roughly in proportion. The room and objects in it can with profit be measured by the children, but the actual construction of a perfect plan is best left to the teacher at this stage. (Making a plan to scale is an exercise in arithmetic suitable for much older children.)

The perfect plan made by the teacher or by older children in the same school satisfies another need. It should be duplicated, so that each child has one or more copies, and used to give what is virtually a first exercise in map-*reading*. Slower children are helped considerably, and all derive satisfaction, if they can study copies of an accurate plan, identifying and naming the objects shown, marking in others which are omitted, etc. This is particularly valuable with large classes, since it reduces the amount of drawing, which can become tedious or mechanical when there are more than, say, twenty desks to be represented. An example of such a plan actually used with a class of boys aged about eight years is shown in Fig. 2. The boys had previously measured the room with rulers and string, and this made it possible for them to appreciate the scale-line (showing all the rulers!). Such a plan may be used for a variety of purposes. To each

individual no doubt the chief interest of the plan lies in the fact that it shows "where I sit"—*i.e.*, it shows the position

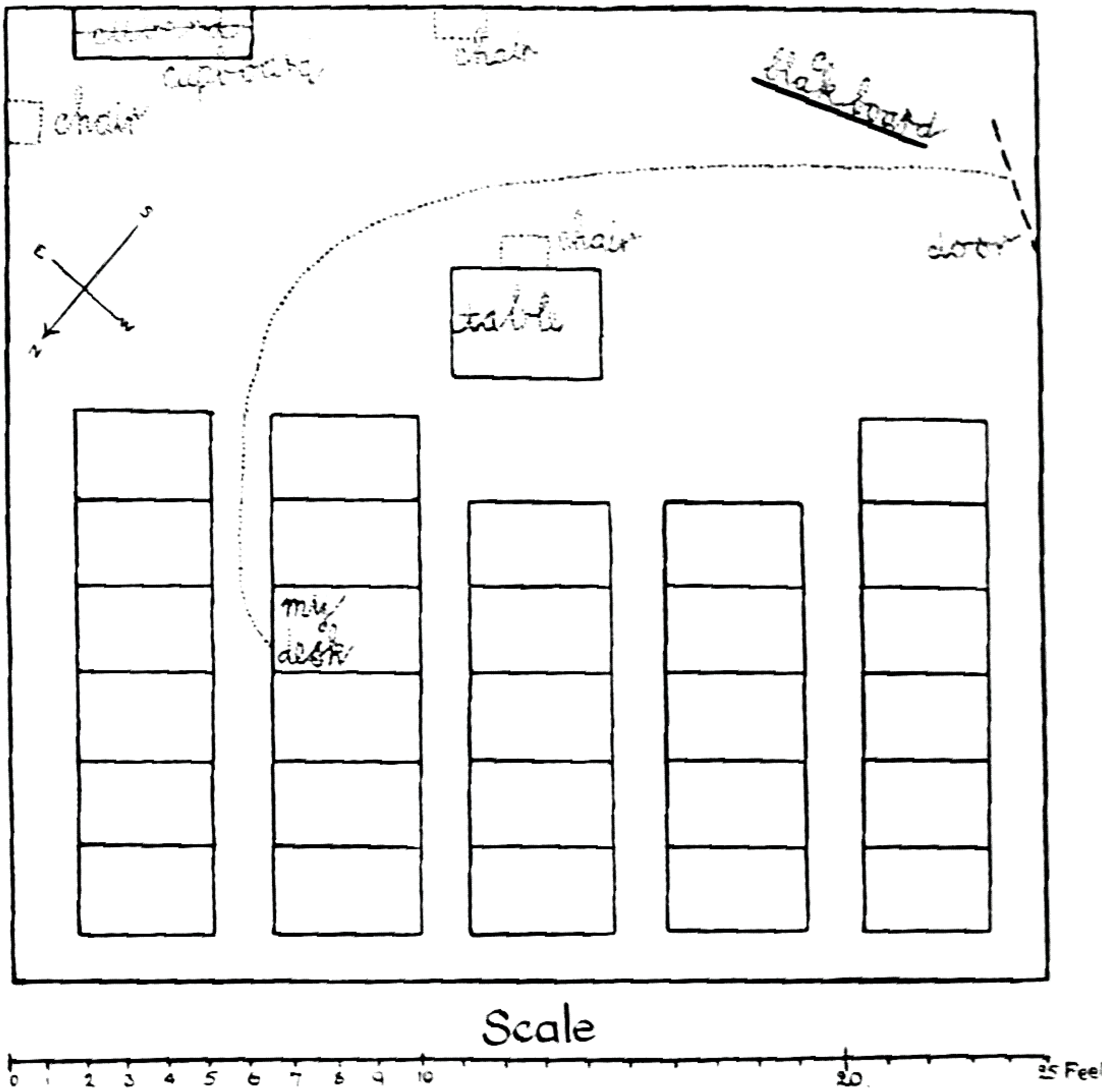


FIG. 2. EXAMPLE OF A FIRST STEP IN READING AND USING MAPS (REDUCED TO ABOUT $\frac{3}{5}$ SIZE OF ORIGINAL)

A plan of the classroom used with 'dull' boys aged about seven and a half to eight years in a London primary school. The plan was prepared by the teacher from measurements made by the children, and hectographed copies were given to each child. Hectographed lines are shown thus: ————; child's additions thus: .... The slower members of the class are greatly helped by reading a correct plan such as this, and by making their own additions to it. This map shows "The Way to My Desk."

of "my desk" in relation to those of my neighbours and to the room as a whole. It can be made to show routes—*e.g.*, "the way from my desk to the door."

Direction

The cardinal points should be marked on this plan after suitable preliminary work. The direction in which the

classroom windows face determines the time during which the sun shines into the room, and the aspect of the room is easily realized by children who have learned to associate the cardinal points with the apparent movements of the sun.

By the time children are eight years old they should have pursued their natural interest in shadows to discover how sun-cast shadows move.[1] One way of doing this is to record (by drawing along it) the shadow cast by a vertical post at different times throughout a sunny day, and, if possible, at different times of the year. North is the direction in which the shadows always point when at their shortest—*i.e.*, at noon by the sun. The line of the noonday shadow is a south–north line. East–west lines are at right angles to it. The children should also realize that all shadows, and therefore all north lines, in the area they can see, are parallel to one another. So are all east–west lines. This leads naturally to an understanding of the correct use of the sign showing the cardinal points—a sign that should be marked on all the large-scale maps they will shortly be using.[2]

North, south, east, and west should never be learned in the first instance from a compass, for the compass merely helps us to find our bearings in relation to the cardinal points, which exist independently of it. The work in the classroom whereby the cardinal points are recorded on the plans and used in various ways is facilitated by the fact that the children naturally work with their plans correctly orientated. Thus, since the plan is placed "the right way" or "the way of the room," to mark a north–south line upon it is to mark a line that runs truly north–south (*e.g.*, the shadow of a pencil standing vertically on the plan at midday). This fact is simple and obvious, and much future misconception and bewilderment will be prevented if it is made clear,

[1] Some detailed suggestions for children's work are set out in Chapter XIII of *Looking and Doing* ("Discovery Book One") (Blackwell, 1948).

[2] The teacher must remember that the sun rises and sets due east and west only at the equinoxes. In this country in summer it rises north of east and sets north of west, and in winter rises south of east and sets south of west. The direction in which we see the setting sun ranges between north-west and south-west.

so that from the start north and south are realized as directions *in a horizontal plane*—even on a map!

Up to this point the plans made have been merely repre-

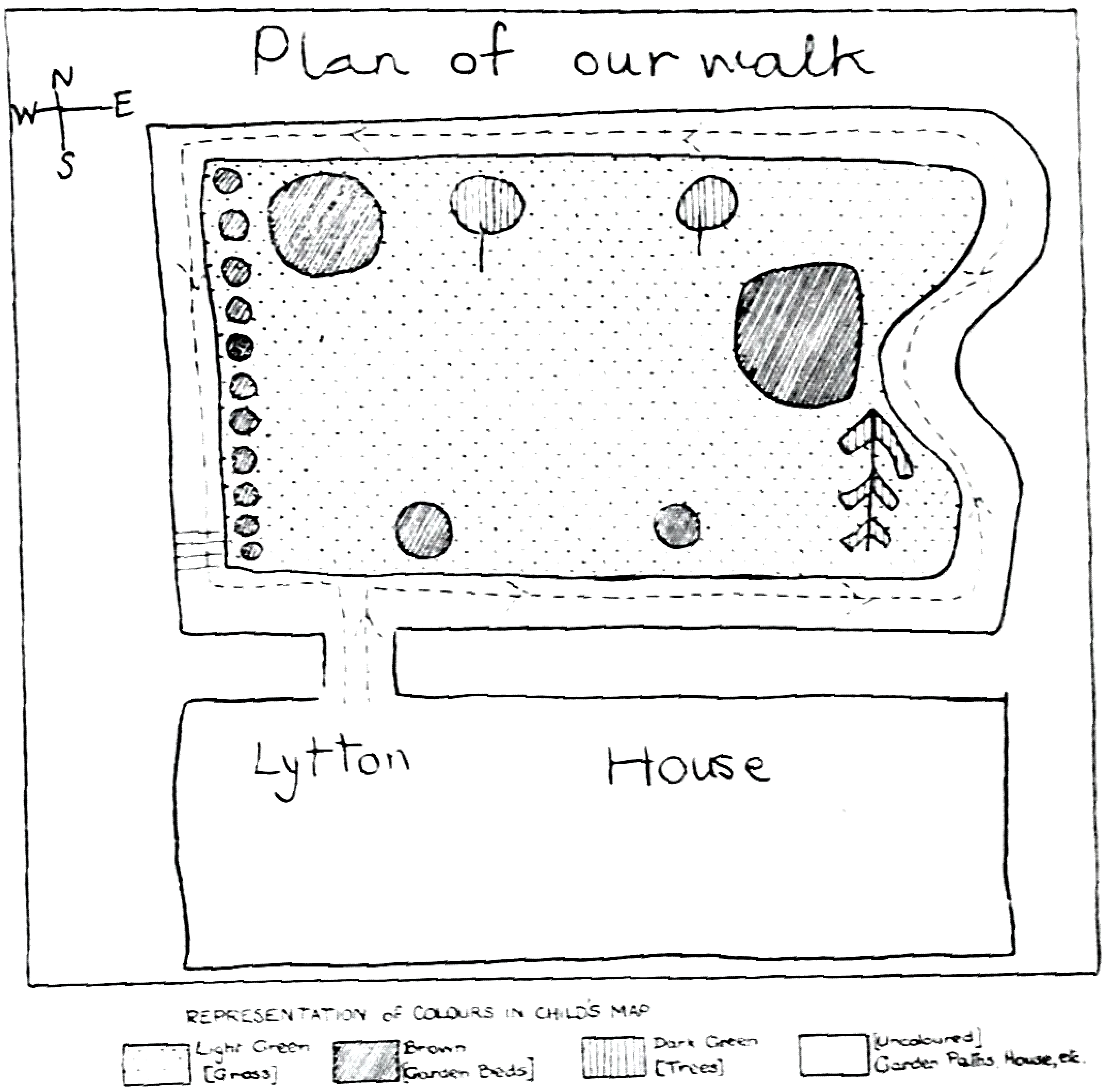


FIG. 3. MAP DRAWN BY A CHILD AGED SEVEN TO EIGHT YEARS SHOWING THE SCHOOL BUILDING AND GARDEN (LYTTON HOUSE, PUTNEY HIGH SCHOOL)

Exact drawing to scale would have been too difficult arithmetically. The child has made the map from observation. Although not used in this case, a certain amount of pacing, merely to estimate approximately the proportion of one side of the lawn to another, may be helpful.

sentations of objects that are in sight. Those to follow have more of the characteristics of real maps, since they *show the relationship to one another, in horizontal space, of objects that cannot be seen simultaneously*—a very important attribute of maps. The next step is to make a 'map' showing what

lies beyond "our classroom." This may be built up round a copy of the classroom plan shown on a much smaller scale than previously, and if the school building lends

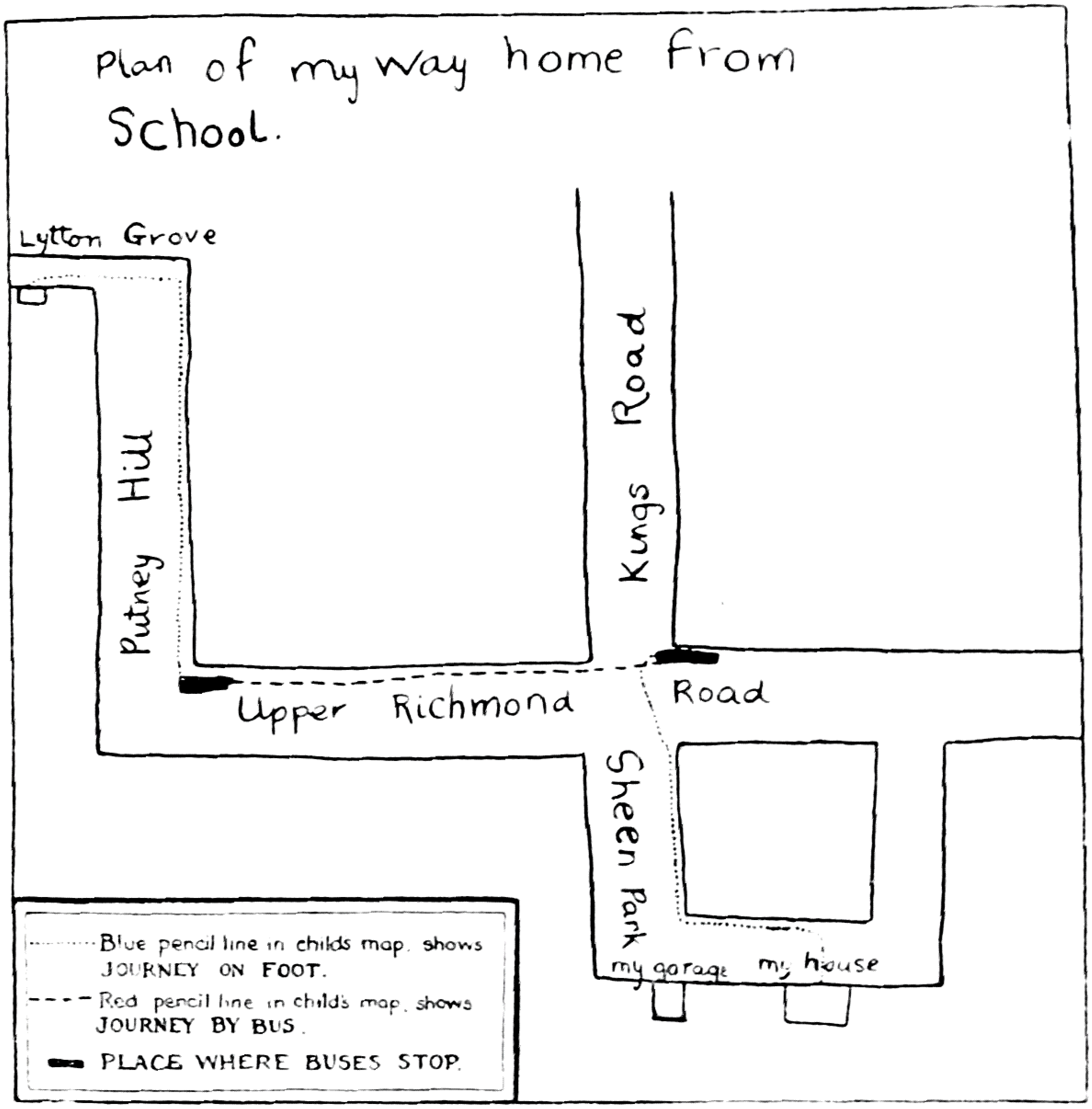


FIG. 4. MAP MADE BY A CHILD AGED EIGHT YEARS (PUTNEY HIGH SCHOOL) (REDUCED TO ABOUT ½ SIZE OF ORIGINAL)

For a map of the same journey drawn correctly to scale see Fig. 5. (*Cf.* also Fig. 6.)

itself—*i.e.*, if it is not too large or complicated in structure —the plan so begun may grow into a plan of the whole floor on which "our classroom" is situated.

Ideas connected with the representation of distance, direction, relative position, are all strengthened in this, as

in the next step, when the start is made from a very small and much simplified plan of the school building, round which the surroundings are plotted more or less approximately, with the map always placed in correct orientation. At this stage, if not before, journeys of exploration are usually needed. Another characteristic of maps is realized—that *they omit much of the detail we know to exist.* As we reduce the scale so we are able to show *more in area,* but *less* of detail within the area. It is now very difficult to show the classroom, and quite impossible to mark the desks.

Map-reading should figure increasingly in the work, and

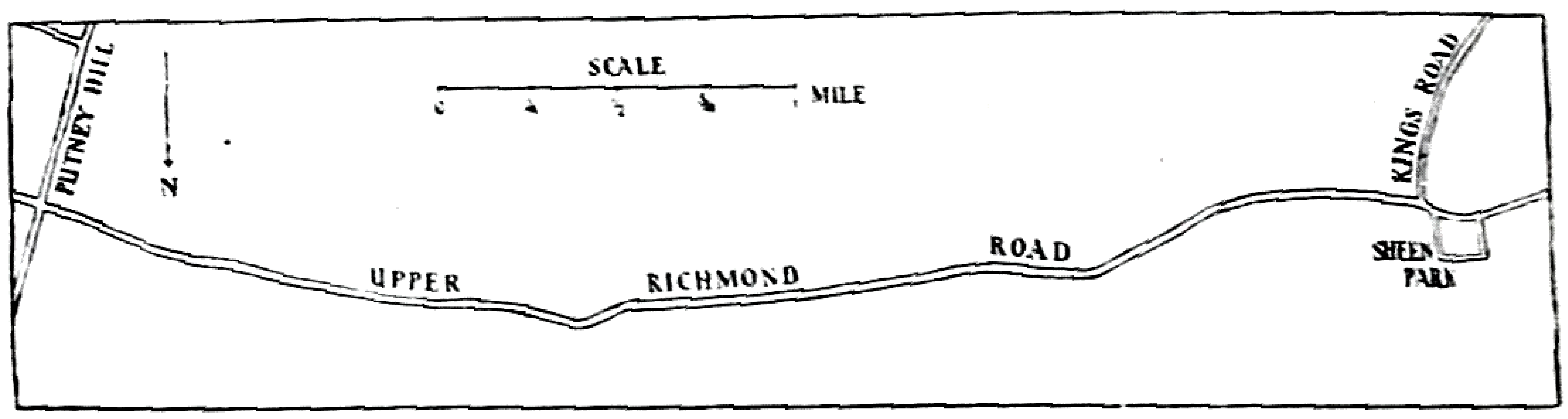


FIG. 5. MAP OF THE ROADS IN FIG. 4 DRAWN TRULY TO SCALE

in the 25" Ordnance Survey maps (not to mention plans on still larger scales) we have real printed maps quite suitable for children of about eight years to study. It is often advisable to precede the introduction of the whole printed sheet by supplying each child with a simplified copy of that portion which shows the immediate vicinity of the school. Short walks outside the school building are needed, for the children to practise setting their maps, and to relate them to the real area which they represent. The children make their own additions to these copies, both by entering names or symbols of features omitted, and by extending the map in any direction that may be desirable. Probably the map which a child delights most to make is that which shows "my way home from school" (*cf.* Figs. 4 and 6). The interest in making maps to show "where I live," "the way to the station," etc., opens up innumerable opportunities for further work. At about this stage many children enjoy making maps of imaginary places (for example, those in

stories), and even of places they remember, such as "where I stayed at the seaside and my way to the beach."

I. A Map to show the School Neighbourhood in relation to the Surrounding District

In country districts the 6″ Ordnance Survey map is often

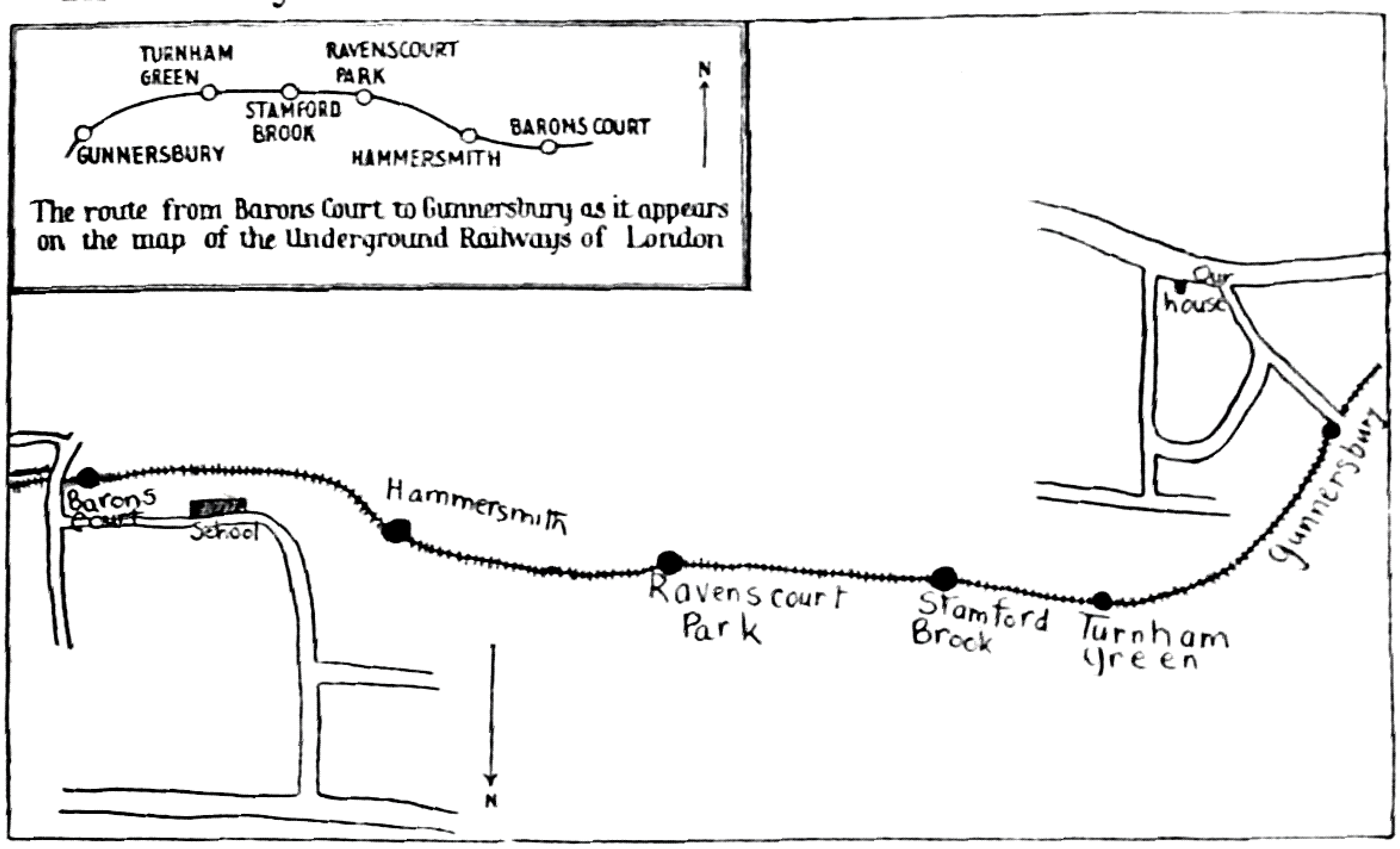


Fig. 6. Child's Map of his Way Home by Train from Barons Court to Gunnersbury (reduced to about ⅓ Size of Original)

Made by a boy aged about eight and a half. (A few minor corrections have been made for the sake of legibility.) Points of special interest are: (i) The child could make the map from his own direct knowledge without reference to any other map. This is indicated partly by the way the railway-line is placed on the paper (contrast the line of railway copied from printed map inset). (ii) The child drew the map in correct orientation. (The class sat facing south.) (iii) The abrupt change in scale between road and railway almost ceases to exist if the map be taken to represent *time* spent rather than *distance* covered.

quite suitable for the children's use, but in towns and cities it is so heavily printed over and so difficult to read, owing to the small type necessitated by the scale, that a simplified copy is required, on which the children can mark places of interest to themselves. If the children live near to the school it may be possible for every child's home to be marked, in which case interesting exercises can be carried out in order to discover distances travelled by different members of the

class on their way to school. This necessitates measurement with the help of a piece of string and the use of a scale-line.

If, on the other hand, the children come to school by train or car, bus or tram, then maps of a yet smaller scale may be needed to show all the facts and to enable distances and directions to be compared. The apparently crude map shown in Fig. 6 is of considerable interest. The abrupt change of scale between the representation of road and of rail may be ignored when it is realized that the child who drew the map was probably little concerned with distance covered. No doubt, also, the absence of interesting detail to record between the stations tended to minimize the distances by rail. A map like this affords opportunity and material not only for teaching the importance of a uniform scale, but also for establishing ideas concerning units of distance.

The children very soon ask for 'real' maps showing places some miles away, like the children in the village school mentioned on page 47. When this happens the largest suitable scale is often 1 inch to 1 mile. For the village children, as in most other cases, it proved suitable to make a simple tracing from the 1″ map, showing only the roads and the village and town sites required. (The easiest method of duplicating is by hectograph.) The new series of Ordnance Survey maps on the scale of roughly 2½ inches to 1 mile will be useful for work at this stage.

The children should see the real map from which the copies have been made. Many children will spend long periods in enjoyment of the local 1″ map. Although much that is shown by it inevitably escapes notice, there is no doubt about the interest it holds, especially for children who have the rudimentary knowledge necessary for some measure of understanding; and it is clear also that the children gain more understanding by examining and using it—*and* asking questions about it. From this, and, of course, from the simplified copies mentioned above, the children should find out definite information. They should note both the direction in which a given place of interest lies as the crow flies, and the directions in which they would travel

to it by road or rail, as well as the distance to be travelled in each case. Distances are measured by means of a piece of string and the scale-line. Children who have been trained in this way show a ready awareness of scale and of the cardinal points when using maps.

Establishing Standards

It is, of course, necessary for children to know the meaning of the units of distance they use. During the course of the work they should have discovered just how long is 100 yards, ¼ mile, 1 mile, etc., have had the experience of walking these exact distances, and know how long it takes them to do so. They should know that the football pitch is 100 yards long, that a certain church, or some other landmark, is 1 mile from the school, and each should know how far he walks to school. In many schools at about the age of eight the children's work in arithmetic is concerned with units of measurement and practice in using them. The work in geography fits in well with this—including the use of *inches* in stating a scale.

In one London primary school it was discovered that practically all the children came from within one square mile. A special map on which children could mark their homes was made on the scale of 25 inches to one mile, with the school in the centre. This map covered an area one mile square. To become aware of this fact, when using such a map of a familiar neighbourhood, should give a clearer knowledge of the size of *one square mile* than many people possess.

Related Studies in 'Human Geography'

Lest it should seem that all the work in geography may be taken up with the mere making of maps at this stage it is probably advisable to mention some subjects that are suitably studied in connexion with the map-work, but also of interest and value in themselves for children of the age under

consideration. Three suggestions will serve as examples here:

(i) The activities of workers on whose services we depend—for example, milkmen, busmen, railway workers, etc.

(ii) Such subjects as "How our roads are made and repaired," "Where our water comes from," "The postal service."

(iii) Any feature in the neighbourhood of particular interest geographically—for example, a factory, market, railway, canal, river, etc.

In different ways and to varying degrees each one of these topics is suitably, often inevitably, connected with map-making or map-study if investigated from a geographical point of view. The work associated with them demands the use of smaller-scale maps—*e.g.*, the $2\frac{1}{2}''$ and $1''$ Ordnance Survey maps—or simple maps derived from these. These maps show places known and unknown to the children, and thus give opportunities for them to exercise their growing capacity to *read* maps and to discover facts about places they have never visited by studying maps.

Map Symbols

This stage will not have been reached without the consideration of various problems about map symbols. The need arises for various signs, to represent features like churches, trees, railways, bridges, footpaths, etc., and though it is as well to follow temporarily suggestions made by the children, ultimately the correct Ordnance Survey symbols should be adopted.

Some educationists consider that children's first maps should be 'picture maps' in which features are represented pictorially. It is true that on the large-scale Ordnance maps some of the symbols *are* pictorial. A wood is shown by small trees placed irregularly, and an orchard by trees placed in rows. In their first maps children often indicate a house, a church, the village pond, by a pictorial drawing of the feature. The decision, as to whether a pictorial symbol may

be accepted, probably should depend on the use to which the symbol is put. A map may show two facts about a given feature—its location and the horizontal space it occupies. (A given map does not necessarily show both facts for all features. The area occupied by a town, as well as its location, is shown correctly on a 1″ or ¼″ map. But on a small-scale atlas map the dot which marks the location of the town does *not* show the space it covers. Apart from its circular shape, the dot often has to be too large in order to be seen. Yet the same atlas map may show correctly the horizontal space occupied by the Dogger Bank, the English Channel, the Isle of Wight—as well as their location.) Just as different pictorial symbols are used on a 1″ Ordnance map to indicate the position of a lighthouse, a windmill, etc., so, on a child's map, a pictorial drawing may be accepted if it is used to show *merely the position* of a house, a pond, a church. When drawing a plan of their classroom many children draw desks, cupboards, etc., in plan, but show the blackboard and easel by a pictorial drawing. If this is taken to show merely the location of the easel the pictorial symbol is legitimate. On the 'scale' of the maps they draw of the area they know, it is correct cartographically for children to mark the *position* of a tree by a pictorial tree symbol, to use a mass of tree symbols to show the *area* of a wood. It might even be considered that they are following the same principle when, like the village children mentioned above, eight-year-olds improve on a road map, hectographed for them, by drawing a mass of small pictorial 'house symbols' to show approximately the area occupied by a town.

The teacher finds many opportunities for seeing that these two distinct purposes are recognized, and for leading the children to appreciate and use methods that are correct. The children's enjoyment of real maps helps in this. It is also a fact that children who have begun with a plan of the classroom do not usually represent such features as a pond, a field, or even a house, by anything but "the space it takes up on the ground."

Maps and Pictures

This early map-work takes place while the children are doing much outdoor 'exploration' and observation, by no means *always* of subjects that lend themselves to recording in map form. Photographs, and pictures drawn by the children, should be used quite as much as maps to record facts noticed. When they are suitable for the purpose photographs of familiar places should be compared with maps of the same places. This is an exercise that carries further the children's understanding of both maps and pictures.

A new kind of photograph is now becoming available—that taken from the air. This has one of the attributes of maps in that it can show simultaneously, in relation to one another, features that cannot be seen simultaneously from the ground. A vertical air photograph is like a map in another respect. It shows the horizontal space occupied, for instance, by a field, quite correctly. Air photographs are not maps, but they are being used increasingly as material from which maps are made. The question arises as to how far and in what ways air photographs are helpful in the early approach to maps. Large-scale air photographs of the familiar neighbourhood are likely to be useful, particularly large-scale obliques,[1] which are easier to read than verticals. Further experiment is needed before definite statements can be made as to methods and possibilities. It is, however, the present writer's experience that children of eight years can readily interpret large-scale oblique air photographs taken from a low altitude and showing features of interest to children. Work in primary schools, both urban and rural, has shown that children aged eight plus, having studied an air photograph of a suitable but *un*familiar area, can draw a surprisingly correct map showing the relative positions and form of the features in the area—*e.g.*, of a curving reach of the Thames crossed by bridges whose direction changes with the river's course. Children can also relate a large-scale

[1] As suggested by Professor D. L. Linton in "The Use of Air Photographs in the Teaching of Geography" (*Geography*, September 1946).

map to an air photograph, provided it is a low oblique and the details shown are sufficiently simple, distinctive, and *interesting to children*—even though the area is one they have never seen. Since air photographs are of great value geographically, and likely to be used increasingly in later geographical work, it seems desirable that there should be some early work by which children gain skill in reading them. (Air photographs of many parts of Britain can be obtained from Aerofilms, Ltd., 29 Old Bond Street, London, W.1, and some, chiefly verticals, through the Geographical Association.)

Summary of the Work done so far

Before discussing new steps in the work it may be as well to summarize the position now reached. It is likely that two terms, or three, have been spent on the course, and the children are probably about eight and a half to nine years of age. They understand many of the most fundamental facts about maps, and can use large-scale maps in many ways.

(i) They realize how, by means of a map, it is possible to discover or to show the relationship of their home town (or borough) to the larger district within which it lies (*cf.* Figs. 7–12), just as it was possible to make a map showing the relation of the school to its neighbourhood, the classroom to the whole floor of the school, etc.

(ii) Each child has gained 'tool knowledge' that will be important in future work. For example, (*a*) he has learned how to measure distances represented on a map, using string and the scale-line, he has found out by experience the length of one mile, and is also familiar with the different lengths that may represent one mile on maps according to their scales (25″, 6″, 1″, etc.); (*b*) he knows how the school, his home, and the main roads of the neighbourhood lie in relation to the cardinal points, and in which direction he must travel by road, rail, or otherwise to reach other towns or places in the vicinity; (*c*) he realizes that the correct position for a map is in a horizontal plane, and is fully aware of the need to have it placed 'the right way.'

(iii) He is becoming increasingly able to read maps of regions he has never seen.

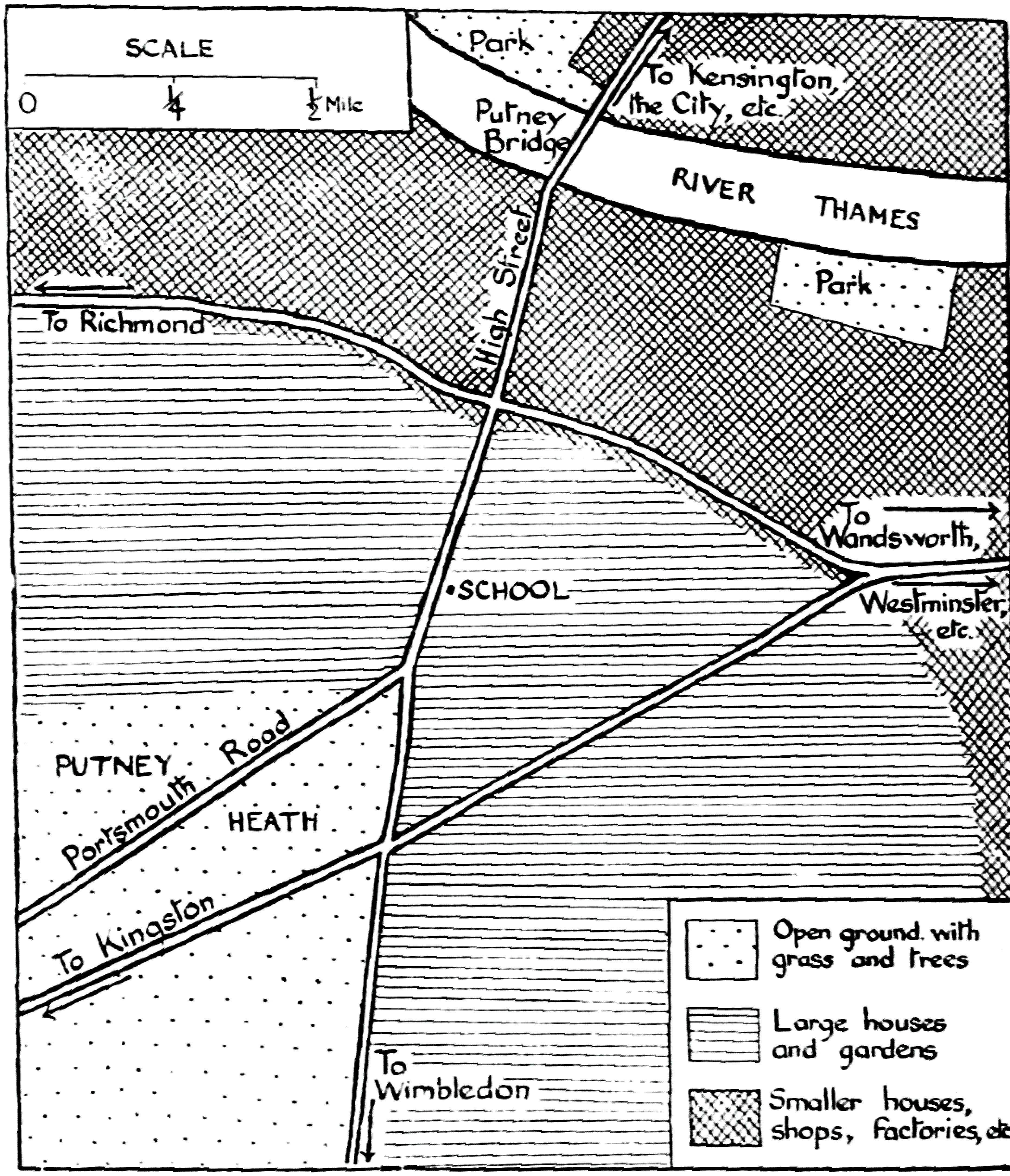


FIG. 7. EXAMPLE OF A VERY SIMPLE MAP TO SHOW THE DIFFERENT REGIONS IN THE SCHOOL NEIGHBOURHOOD

A map of this kind can be made by a child (using colours) on an outline which gives roads only. This map also suggests the need for a map of a much larger area—*e.g.*, to show the destination of the Portsmouth Road, etc.—to relate the Putney district to its wider setting. (See Fig. 8.)

(iv) The work has acquired more and more of the characteristics of real geography. The map is a thing to be used, a convenient form in which to express geographical facts.

Up to this point no children are likely to confuse the map and the reality. In the work to follow, with maps on smaller scales, the remoteness of the map from the reality becomes greater. Yet if suitable use is made of the knowledge he now possesses a child should approach atlas- and wall-maps

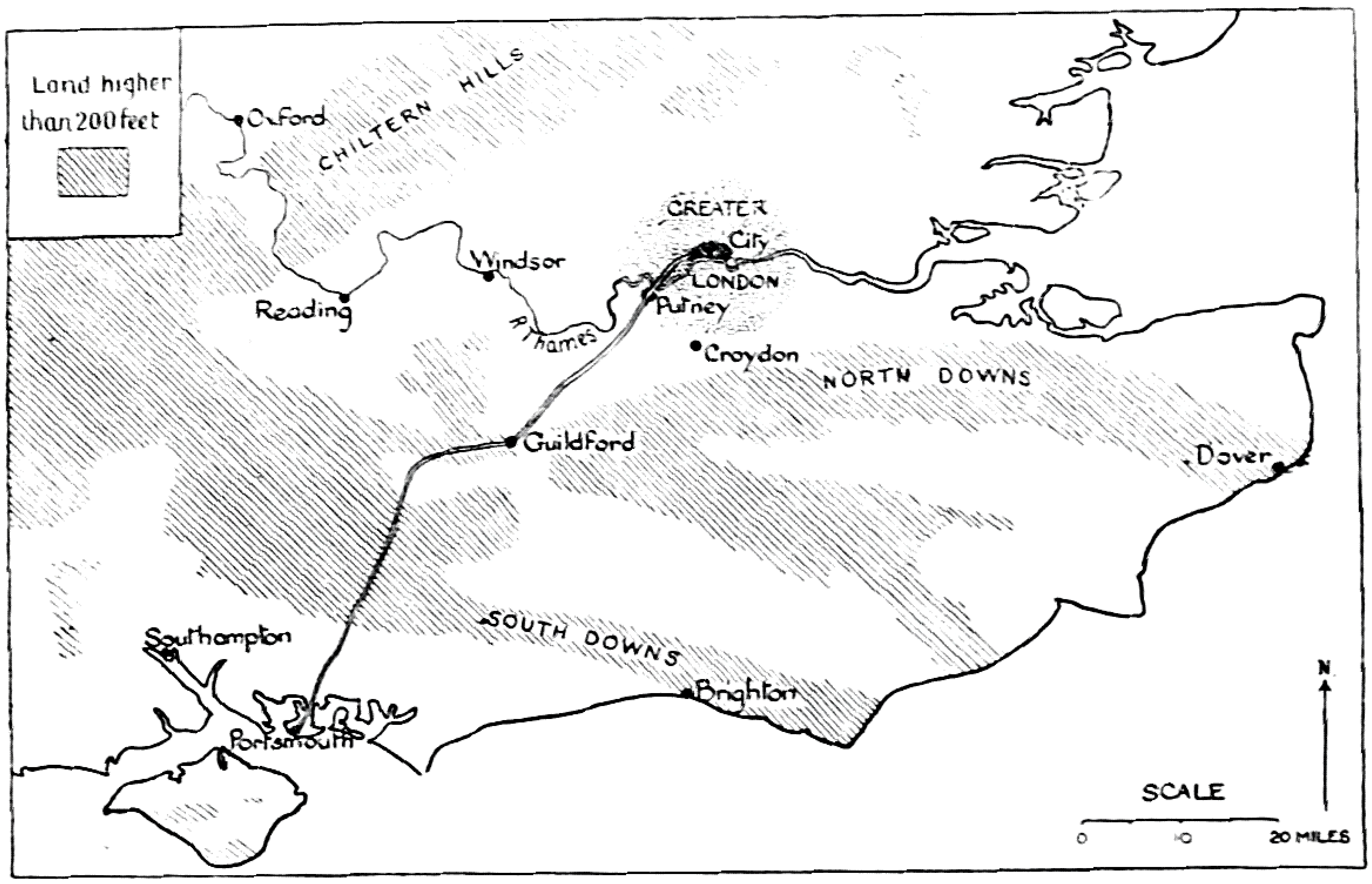


FIG. 8. MAP TO SHOW THE POSITION OF PUTNEY

In relation to (*a*) London; (*b*) the lowland near London and the hill-ridges which surround it; (*c*) the river Thames; (*d*) the coast of South-east England; (*e*) the Portsmouth Road, which leaves London *via* Putney. (Putney Bridge was the second bridge to be built across the Thames in London. It broke the centuries-old monopoly of London Bridge in 1729.) A map of this kind can be used in different ways with children of any age from eight years. (See Fig. 7.)

with a development, not a lessening, of his understanding. For example, he should not be one of those who, a few years older, think of Africa as little different in size from Great Britain, or are vaguely surprised at such a phenomenon as the river Nile, which flows *up* into the Mediterranean Sea!

II. Bridging the Gap between Large-scale Maps and the Wall- or Atlas-map of Britain

There is an obvious gap to be bridged between the large-scale Ordnance Survey maps that have been used hitherto

and the small-scale atlas-maps or wall-maps that must be used very soon. Experience suggests that two methods are particularly suitable:

(*a*) By the Use of Additional Ordnance Survey Maps

If the school possesses the necessary maps it is possible for the sheet which includes the home area to be extended by the addition of adjoining sheets, so as to build up a large piece of the map of Britain, including a portion of the sea-coast. The most suitable maps for this purpose are the coloured ½″ or ¼″ Ordnance Survey sheets.[1]

Children who have used the ½″ map of their home area and have travelled a little within the region, by school expeditions or otherwise, should have some idea of the great size of the piece of country which the ½″ sheet represents. They take delight in placing this map (orientated) on the floor, and in piecing together and around it as much of the map of Great Britain as is available on the same scale.[2] Then the wall-map of England (or of the British Isles) can be placed beside it and compared. The area covered by the familiar local sheet can be indicated on the wall-map and the scale of the latter discussed. From this work the children gain important ideas:

(i) Concerning the vast size of the whole country, represented though it may be by an atlas-map less than a foot square!

(ii) Concerning the limitations of the wall- and atlas-map. Although the ½″ maps mark the smallest villages, and even certain important buildings, only the names of large towns can be printed in a type easy to read. (No attempt should be made to use these maps in any way that requires unsuitably close study by children of this age.) When the scale is reduced to that of the wall-map, then all but the important places must be omitted—*i.e.*, the children come to appreciate

[1] See p. 75.

[2] With large classes this work is best done with groups of not more than ten children at a time.

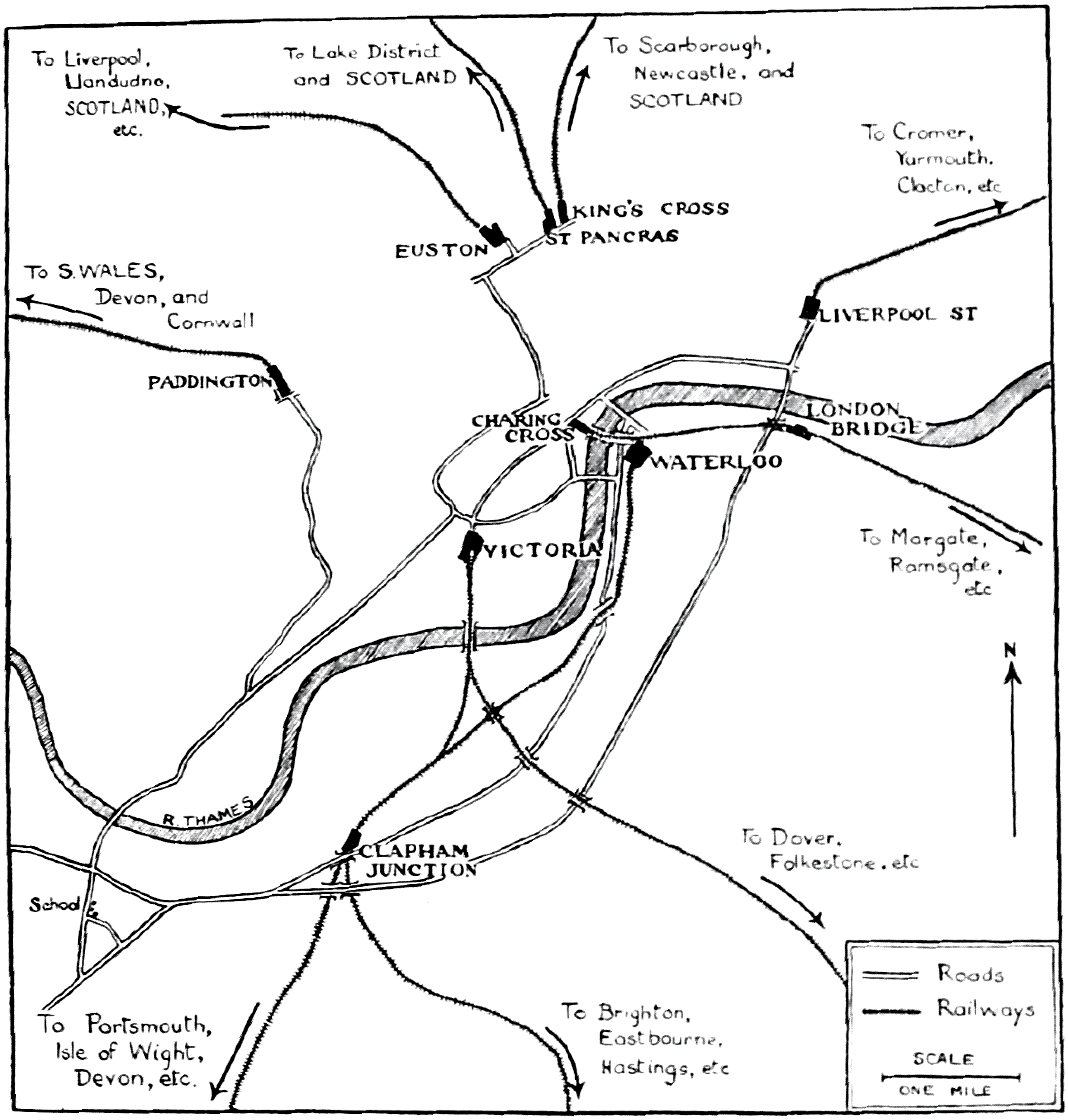


FIG. 9. MAP TO SHOW THE POSITION OF IMPORTANT RAILWAY TERMINI IN LONDON AND THE WAY TO THEM BY ROAD FROM THE SCHOOL AT PUTNEY

The map is an example of one step in a piece of work which leads to the relating of large-scale local maps to small-scale atlas- or wall-maps of Britain. Hectographed copies are provided for the children to study and to fill in as they need, in this case to show the stations from which members of the class travelled to various destinations on their holidays. (*Cf.* Fig. 10.)

Based upon the 1" Ordnance Survey Map of the London District (Tourist Edition), with the sanction of the Controller of H.M. Stationery Office

the fact that the wall- or atlas-map fails to show the country-side in any detail.

(iii) Concerning the importance of orientating the map of

Britain in order to view the home town correctly upon it. One has only to consider how essential this would be in an attempt to investigate the course of an aeroplane flying over the home town in a uniform direction to another part of Britain.

(iv) Concerning the fact that maps as they know them are not 'wholes' in themselves, but fragments that may each be extended by the addition of adjacent sheets.

Following this, ½" or 1" layer-coloured maps of distant parts of Britain can be related similarly to the wall-map, and also studied on their own account. For this purpose it is best to select maps which include easily identified portions of the coast—*e.g.*, Cornwall, Kent, the Lake District, the Wash, the Isle of Wight, etc. It is also valuable to include places known to some of the children from holiday visits, and places of which pictures may be obtained for study with the maps.

(*b*) By Studying and Mapping Journeys

When one or more journeys to relatively distant places are familiar to most of the children (*e.g.*, from London to a popular seaside resort or from the home town to London) this journey may be mapped and used as a unit by which to estimate other distances, and so to arrive at some conception of the size of Britain (see Figs. 9–12). Fig. 12 illustrates the simple map-work of the kind suggested, and the child's note below it suggests the type of conclusion to be drawn, as well as the greater accuracy and interest given to the work by the reference to a real railway time-table. In schools where the system of subjects and time-tables is still in use there is little time for such exercises in a geography lesson. Yet they readily lead to interesting and useful work for the arithmetic periods. Their chief purpose in geography at this stage is to give the children as correct as possible a conception of the size of their own country. Statistics of length or area have much less meaning for children—if not also for adults—than particulars of journeys, giving time spent—*i.e.*, experience or reference to experience, for example, of

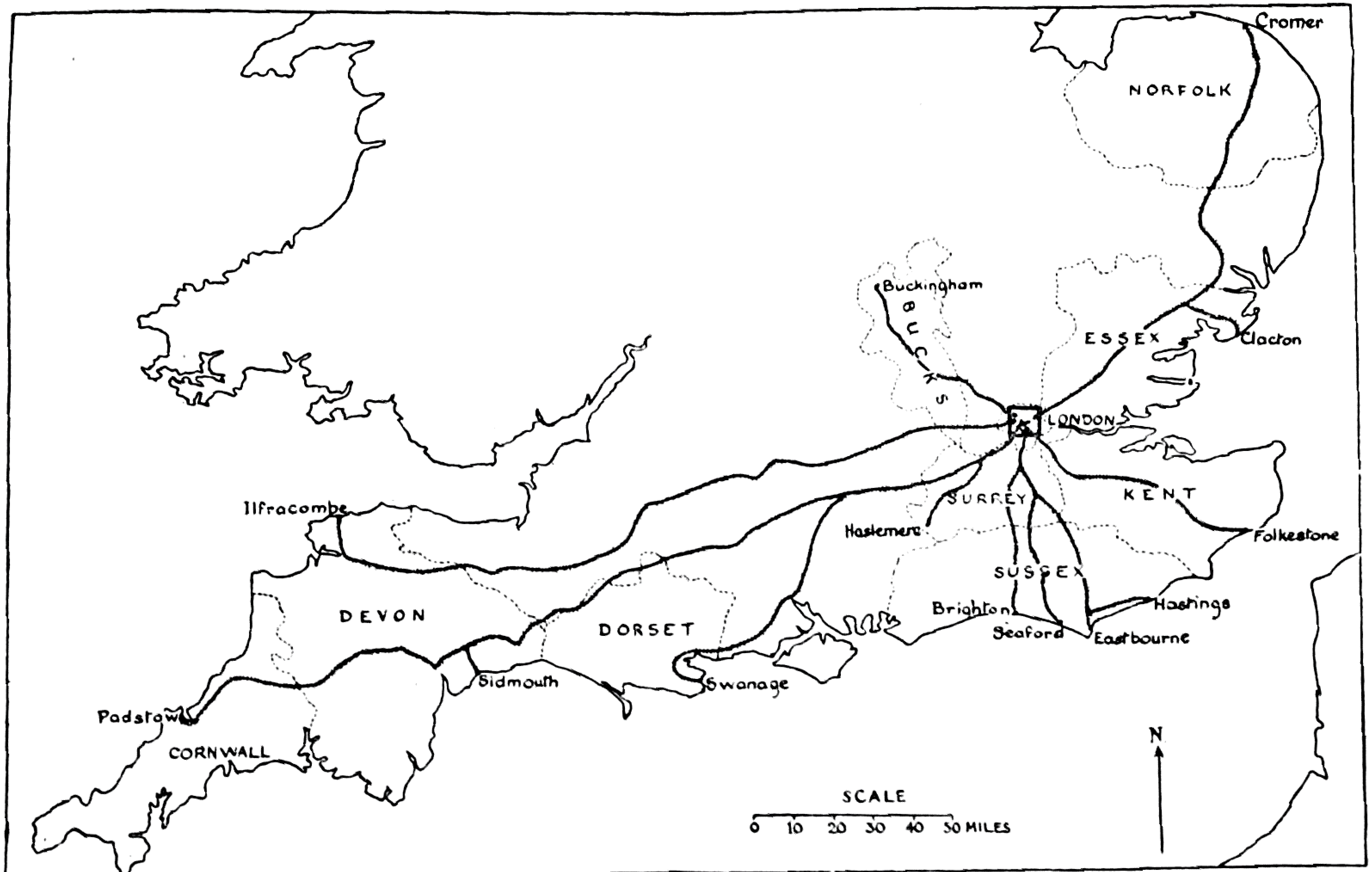


FIG. 10. MAP SHOWING THE POSITION OF THE PLACES TO WHICH SOME OF THE CHILDREN IN THE CLASS WENT BY TRAIN FOR THEIR HOLIDAYS

This map is an example of one of many ways in which it is possible to relate large-scale local maps to atlas-maps. The square marked within the County of London encloses the area shown on a larger scale in Fig. 9.

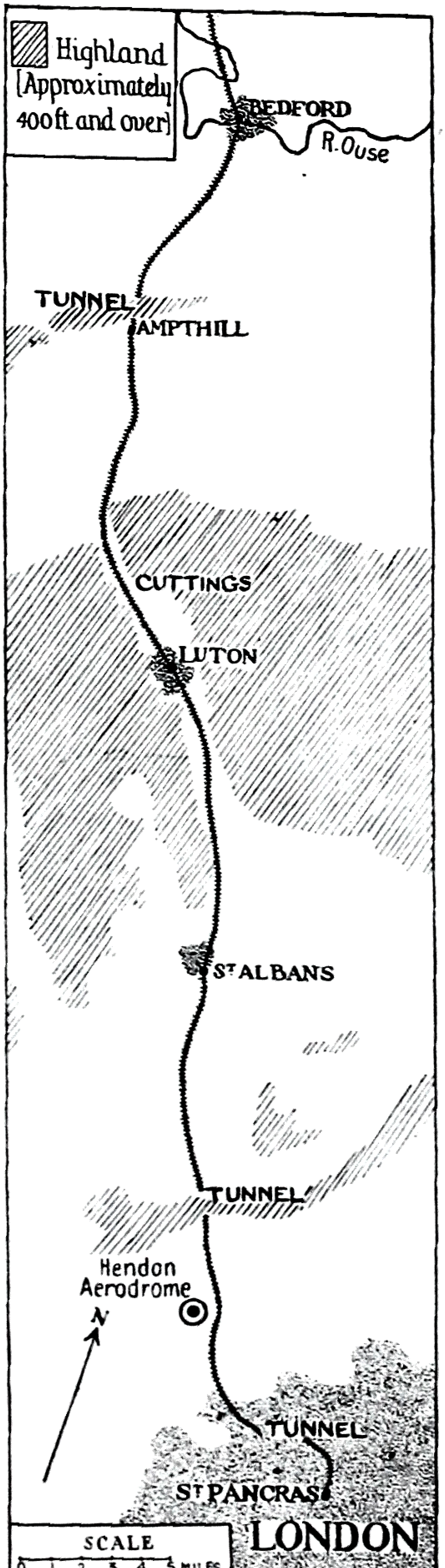


FIG. 11. MAP OF THE RAILWAY BETWEEN BEDFORD AND LONDON

A map of this kind forms a suitable step in the approach to a map of the British Isles for children aged eight to eight and a half years. It was used with children in a Bedford school to whom the railway journey to London was well known. They were interested in mapping familiar details, and learned several facts about relief, communications, etc. The hill-ridge at Ampthill rises abruptly and, though lower and narrower than the chalk ridge to the south of it, necessitates a tunnel, while the latter is pierced by cuttings only, the railway making use of a well-marked valley. (Knowledge of this kind corrects the suggestion given by toy railway accessories—that a railway will run directly towards an isolated hillock and tunnel through it.) (*Cf.* Fig. 12.)

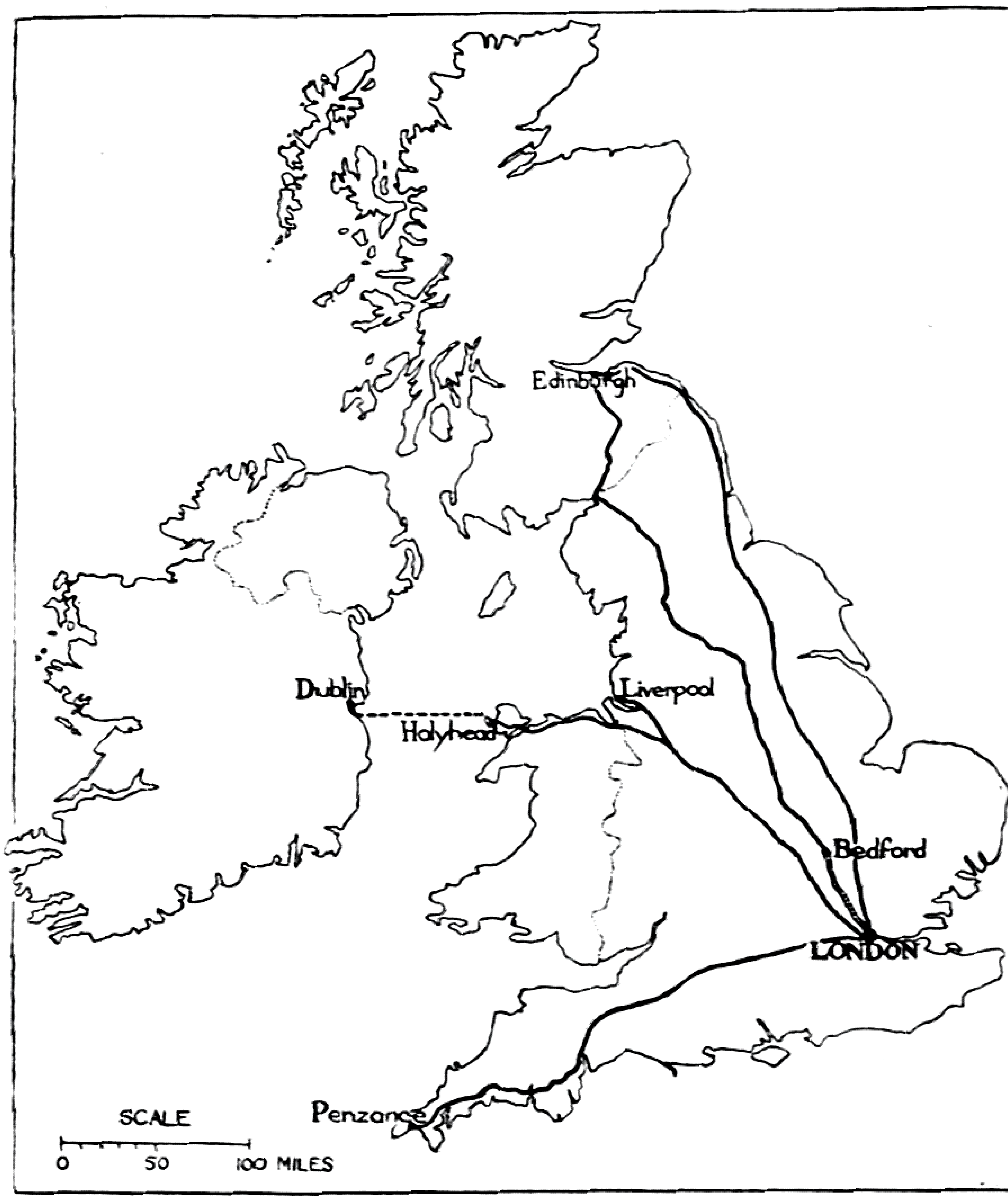


FIG. 12. EXAMPLE OF A MAP FOR USE WITH CHILDREN IN BEDFORD AGED ABOUT EIGHT AND A HALF YEARS MAKING THEIR FIRST ACQUAINTANCE (IN SCHOOL GEOGRAPHY) WITH THE MAP OF THE BRITISH ISLES

The railway journey shown in Fig. 11, and familiar to most of the children, is marked by a broken line. It is to be compared with journeys to places at greater distances from London, with the help of details gained from an ABC railway time-table, as follows:

JOURNEY	DISTANCE	
London to Bedford	50 miles	A good train takes 1 hour
,, ,, Liverpool	200 ,,	,, ,, ,, about 4 hrs.
,, ,, Penzance	305 ,,	,, ,, ,, ,, 7½ ,,
,, ,, Edinburgh	406 or 392 miles	,, ,, ,, ,, 8 ,,
,, ,, Dublin	355 miles	By train and boat about 9½ ,,

Example of a Child's Note: "To go to Penzance you would go to London first if you went by train. The journey to Penzance from London is more than six times as far as the journey to London from Bedford. If you could fly to Penzance by aeroplane from Bedford in a straight line it would be about 270 miles. You can see this by measuring with the scale-line."

meals or 'bed' on the train. The better school atlases give maps of England 'on the same scale' in an attempt to suggest the size of a country or continent.[1] If, however, we have little or no idea of the size of England no attempt to judge the size of any other country by this means can be worth much.

A First Introductory Survey of the British Isles is now practically under way. There is no end to the forms which it may take. Generally a suitable keynote is provided by a topic in which the children are particularly interested (*e.g.*, railways, places visited on holidays, etc.). Some teachers prefer to take 'imaginary journeys' in various directions to places of special geographical interest. Whatever method or matter is used, the work cannot be in any respect exhaustive. It should merely give some knowledge of the relative positions and characteristics of a very few important places and natural features in 'other' parts of our country. The topics selected should be treated descriptively, and should keep well in touch with the children's interest in *people and their activities*. The workers chosen for special study should be such as afford interesting contrasts with those already familiar to the children in the home area. They should belong to a town or region important for the industry or other feature in question, and the position of the place should be noted and marked on the map. Children in a country market-town would do well to learn, for example, about the work of fishermen (*e.g.*, of Yarmouth), dockers (*e.g.*, at Liverpool), coal-miners (*e.g.*, of South Wales), etc. Children in residential suburban areas could profitably do likewise. The lack of realization among the latter concerning the life of people less comfortably provided for than themselves is exemplified in the remark of a little girl aged nine, who expressed her astonishment on learning about the work of coal-miners by remarking, "But why *do* they do it? I'd *much* rather be a lady than a coal-miner!" Here at the very outset of the school course in geography it should be

[1] *Cf.* Fig. 28 (p. 140).

possible for children to begin to acquire the type of knowledge and the attitude of mind which makes for breadth of understanding and sympathy towards those whose lives are determined by an environment and by circumstances greatly different from their own.

Provided direct observation is made possible by means of school journeys, a yet more valuable subject for town children is 'farming,' if only for the reason that modern education should do something to renew the contact with 'Mother Earth,' which is completely lacking in the lives of many under present-day conditions. Such operations as ploughing or sheep-shearing are fascinating for children to watch, yet though these processes are important parts of man's oldest and most essential industry, and though children are required to read and to use such terms as *ploughing* quite often in later work (as if the details of the processes were realized and understood), a surprising number of those leaving school at present cannot describe them, never having witnessed them. For this and other reasons all the work should be based as far as possible on direct observation, or, failing that, on its substitutes—studies of cinema films, lantern-slides, and pictures of all kinds. It should not as a rule be given as mere 'telling' by the teacher.

Studies of this kind form the counterpart of those suggested on p. 60 (in connexion with earlier map-work). They make it easier for the children to realize that the map of Britain represents a widely spreading country, with many changing landscapes, and peopled by millions of folk, about whose daily work we can know only the smallest fragment, so infinite is the variety. Only a tiny fraction of the whole country can be known to the children by actual experience. Some remote parts have probably been visited by individual members of the class, but on the whole it is at this point that the children make almost, if not quite, their first big encounter with "things new and strange" in geography—*i.e.*, with a type of subject-matter which necessarily forms a very large part of school-work in this subject. There is an obvious advantage in the fact that this first step is concerned

with British people and with conditions in our own country, for, great though certain differences are, there is an absence of those still greater differences which to be imagined correctly need a richer mental equipment than is possessed by an ordinary child of eight to nine—*e.g.*, differences of climate or of racial, social, and religious circumstances or conditions which must form part of any 'accurate imagination' of the life of people in parts of India or of China.

The material from which to choose is so unlimited that this survey of the activities of people in other parts of our own country might be prolonged to a year or more. There are several reasons why it is better to limit it to less than this. Whatever is studied at this stage cannot be treated completely, and most of the subject-matter that is suitable will be returned to more than once in the later work. The children are as yet unable to read with sufficient ease to use books very much, and this is the kind of subject-matter that they will be able to gather for themselves with the help of books later on. The work outlined in this chapter should probably finish by the time the children are about nine years of age. The course to follow, introducing the globe and maps of the world and of the continents, cannot suitably be started before the children have some slight familiarity with the map and the geography of their own country and of the land and seas around it.

By the age of nine a child is likely to meet maps of the world and of the continents, etc., in many connexions, and it is important that he should regard them in a way that is geographically sound as early as possible.

SUGGESTIONS FOR READING, ETC.

Information as to Sources of Maps

The following are obtainable from the Ordnance Survey Office, Southampton:

A Description of Ordnance Survey Large-scale Maps (25″ and larger scales). *A Description of Ordnance Survey Medium-scale Maps* (6″ and 2½″). *A Description of Ordnance Survey Small-scale Maps* (1″ and smaller scales).

Conventional Signs and Writing for the Revised 1″ Map of Great Britain.

For certain areas Ordnance Survey sheets on the New Grid, on scales of 50″ and 25″ to 1 mile, are now available.

The O.S. sheets on the scale of 2½″ to 1 mile are also invaluable.

For index-sheets and particulars of reduced prices of maps for educational purposes application should also be made to the Director-General, Ordnance Survey Office, Southampton.

J. Bartholomew and Son, Ltd, the Geographical Institute, Duncan Street, Edinburgh, also publish useful maps (2 miles to 1 inch, and other scales).

The Bartholomew *Road Map of England and Wales*, layer coloured, scale 10 miles to 1 inch, is valuable for its inclusion of villages.

The following are published by George Philip and Son, Ltd, 32 Fleet Street, London, E.C.4: Philip's Regional Maps (of parts of the British Isles). Also wall-maps of England and Wales, and of the British Isles, on a variety of scales.

Reference Books

FAIRGRIEVE, J.: *Geography in School*, Chapters XI and XII (University of London Press, 1949).

ORFORD, E. J.: *Junior Practical Geography* (Teacher's Book; University of London Press, 1932).

See also lists of books related to maps and map-work on pp. 124, 125, 268, and 328.

Examples of Books Useful in Studies connected with the Activities of Workers in Different Parts of Britain

Young Farmers' Club Booklets. No. 1, *The Farm. The Work of the Farmer: What, Why, and How He does It*; No. 7, *Farm Implements* (National Federation of Young Farmers' Clubs).

STREET, A. G.: *Farmer's Glory* (Faber and Faber, 1932), *Round the Year on the Farm* (Oxford University Press, 1941), and other books by the same author.

HART, R.: *Both Sides of the Road: A Book About Farming* (Collins, 1950).

Land at War (H.M. Stationery Office, 1945).

ANSON, P. F.: *Fishermen and Fishing Ways* (Harrap, 1932).

GIBSON, CHARLES R.: *The Wonders of Coal* (Seeley, Service 1930).

LUPTON, L., and REED, B.: *Machines* (Oxford University Press, 1940).

WOODS, K. S.: *Rural Crafts of England* (Harrap, 1949).

STOWE, E. J.: *Crafts of the Countryside* (Longmans, 1948).

RICHARDS, B. T.: *Houses* (and other books in the "Men at Work" Series) (Longmans, 1952 *et seq.*).

NEWTON, H.: *British Canals* (Allan, 1948).

ROLT, L. T. C.: *The Inland Waterways of England* (Allen and Unwin, 1950).

EXAMPLES OF BOOKS FOR CHILDREN'S READING

YOUNG, E.: *At Work in Britain* (Evans, 1933).

SANDERS, E. M.: *Pictorial Geography*, Book II: "The British Isles" (Philip, 1930).

GARDNER, JAMES: *On the Farm* ("Puffin Picture Books") ("Penguin Books," 1940)—and others in the same series.

RICHARDSON, D.: "Introduction to Citizenship" series: 2, *About Dustmen*; 4, *About Postmen* (Ginn, 1939).

DARLING, F. FRASER: *The Seasons and the Farmer* (Cambridge University Press, 1939).

CAREY, M. C.: "The Everyday Books": *The Postman*; *The Milkman*; *The Engine Driver*; *The Baker*; etc. (Dent, 1938).

VARIOUS AUTHORS: A series in colour photography, published by Collins. *The Seaside Book*; *The Farmyard Book*; *The House that Jack Built*; *The Bread We Eat*; *Going Shopping*; etc.

BOUMPHREY, G.: "Our Everyday World": *The Pillar Box*; *The Bus*; *The Water Tap*; *The Dustbin*: *The Policeman*: *The Fire Engine* (Oxford University Press, 1949).

GARNETT, O.: "The Discovery Books": Book One, *Looking and Doing*; Book Two, *Finding Out* (Blackwell, 1949 and 1951)

THORNHILL, P.: *Inland Waterways*; *Houses and Flats*; and *Roads and Streets*; and other books in the "Get to Know" Series (Methuen).

CHAPTER IV

AN APPROACH TO THE MAP OF THE WORLD

If the method followed hitherto is continued, then the next step must be to relate our own country to its surroundings in a manner comparable to that by which the home area was related to a larger region. This new development generally arises spontaneously, perhaps in answer to children's questions about mysterious markings on the printed map of the British Isles (*e.g.*, shipping lines, a portion of France or Norway appearing in the corner of the map, etc.), sometimes through the study of subjects connected with our own country, which, to be followed up satisfactorily, necessitate looking farther afield. Boys are often keenly interested in aeroplane routes, and it is possible for them to investigate the air-lines—for example, from Northolt—to important places on the Continent, or even beyond.

In this or in any other suitable way the children become acquainted with the distribution of land and water in the neighbourhood of the British Isles,[1] with the names and positions of the more important countries, seas, etc., in Western Europe, and at the same time learn a little about the places mentioned and about the life of people who live there. Doubtless the children have already heard of France, Holland, Norway, etc., but now they are able to see how they all lie geographically in relation to Britain and to one another, how they compare in size, and in other respects. The children can now both *read* certain facts about these countries from maps and *express* parts of their own knowledge in map form (*cf.* Fig. 13).

A further point about children's maps should be mentioned here. Some authorities assert that a child should approach

[1] *Cf.* H. J. Mackinder, *Britain and the British Seas* (Oxford University Press, 1920), Chapter II.

real maps by first using 'picture-maps.' If by a 'picture-map' is meant one which indicates, for example, that elephants live in Africa by portraying an elephant on the map it is open to criticism, especially for use with children, because (*a*) the immense size of the elephant (probably several times the area of England) minimizes the size of Africa every time that the child looks at the map, even though he is aware in a general way that the elephant is too big[1]; (*b*) the distribution of elephants cannot be shown: inevitably wide regions where elephants are numerous are not indicated, or else parts of the picture cover areas in which elephants do not exist; (*c*) if a child is too young to appreciate that a wash of colour represents the regions where elephants are to be found he is too young to be using a map seriously at all.

It is true that pictorial symbols are found on many ancient maps, but their use by geographers has now been superseded, except on large-scale maps where they can be massed to show distributions, or where their size is more nearly true to scale (*cf.* the tree symbols on the 6″ Ordnance Survey map). On ancient maps the pictures were often used for decorative purposes or to occupy blank spaces.

Laborious map-drawing should be avoided, but outline maps prepared with the exact requirements of the children in mind should be used. (Mechanical map-duplicators and printed outline maps can seldom give what is needed. The teacher's hectograph, or any other duplicator for which a map can be drawn, is the most satisfactory means by which the children's requirements can be met.) The activity of colouring land areas to distinguish them from seas is definitely valuable, since it helps to give the children that working familiarity with the distribution of land and water that is necessary if the map is to be used for general reference purposes, and yet which is frequently overlooked or taken too much for granted. A few places of special interest to the children should be marked and named. The maps themselves should be large and bold enough for the children to find no

[1] A verbal statement is generally less effective than a visual impression.

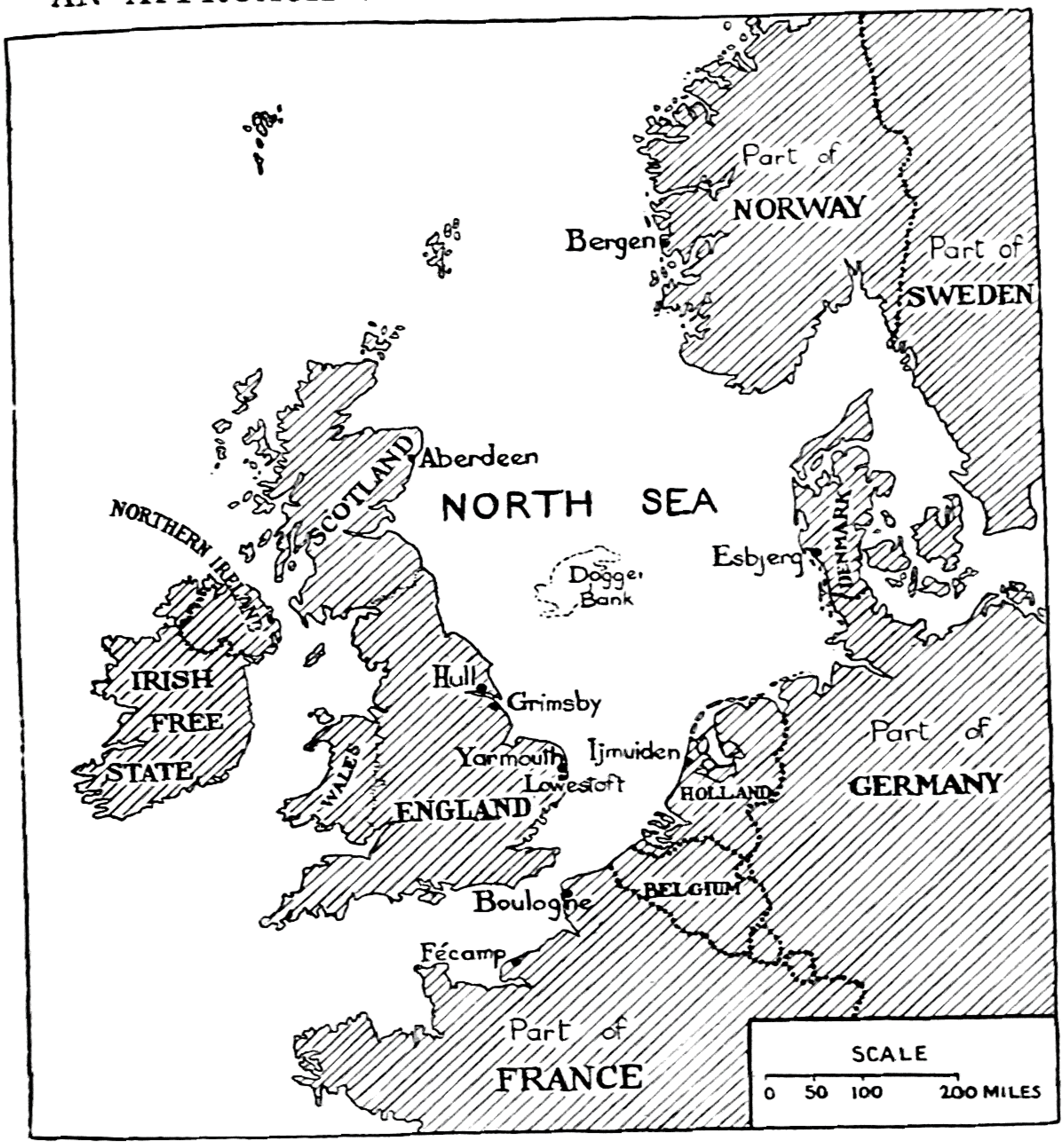


FIG. 13. EXAMPLE OF A MAP USED IN WORK INTENDED, AMONG OTHER THINGS, TO GIVE A PRELIMINARY IDEA OF THE GEOGRAPHICAL SETTING OF THE BRITISH ISLES

In this case the interest in fishing, first aroused in connexion with "Workers in Britain," is pursued further, to include some knowledge of the fishermen who come from other lands to fish in the North Sea. The map shows: (*a*) *The North Sea and the lands around it*; (*b*) *Some of the most important fishing ports*, from which the boats go out in hundreds to fish in the North Sea. (See book-list on p. 95.)

great difficulty in using their own script, and so that the result is not cramped or crowded with names. In every case the map should be given a suitable title stating its purpose (*cf.* Figs. 13 and 14).

A broader outlook is being developed, and the children are now beginning to see their own country as a comparatively small one. The positions of more and more of the countries,

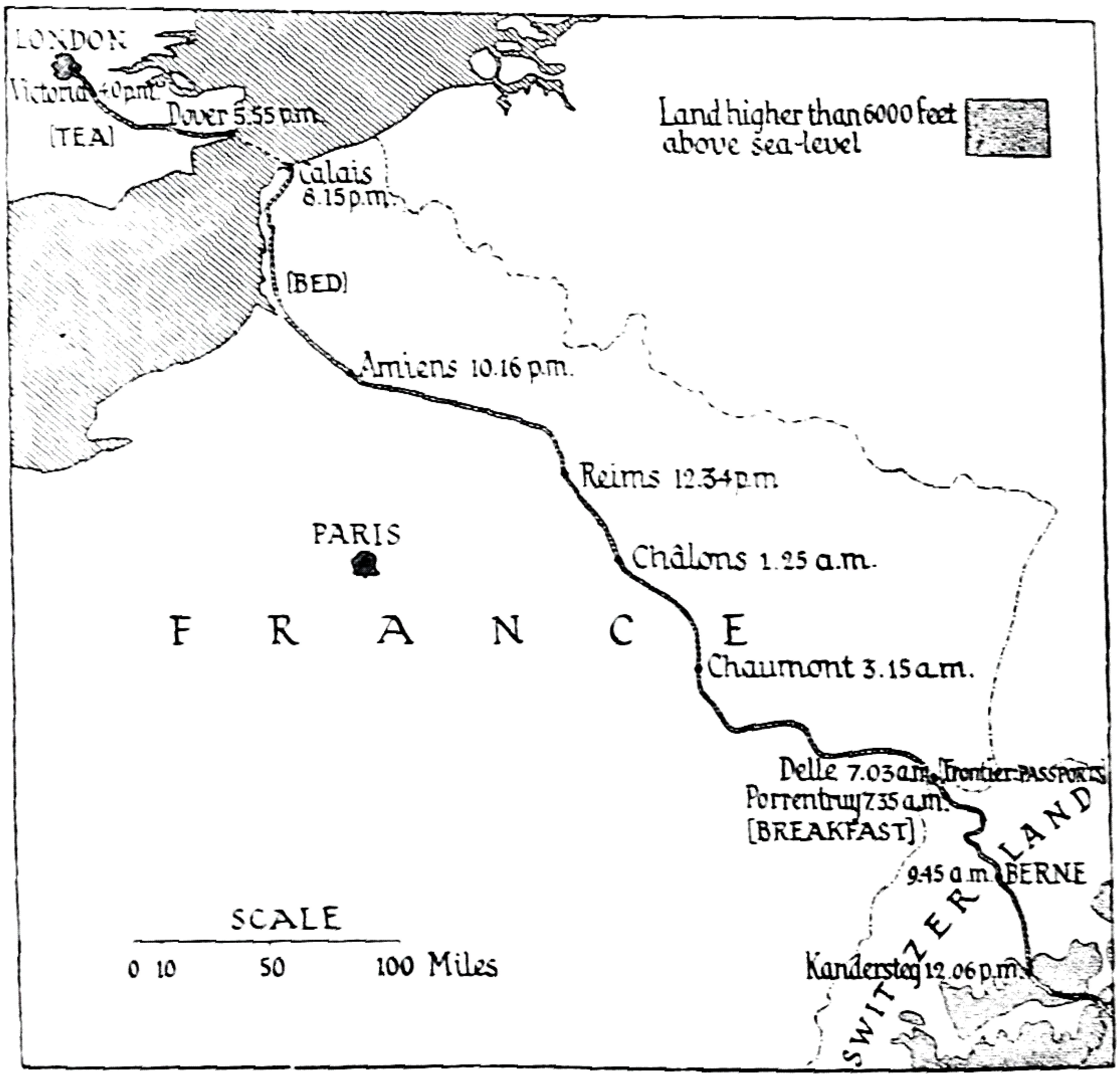


FIG. 14. MAP SHOWING "THE WAY JOHN WENT TO SWITZERLAND"

The boat-train left London (Victoria) at 4 P.M. on July 24. John arrived at Kandersteg at 12.0 midday on July 25. This map suggests an attempt to estimate distance travelled in terms of time spent. Children who have not made the journey can interpret it partly by comparison with facts about more familiar journeys represented in Fig. 10.

cities, and other features, such as mountains, etc., about which the children already know something from hearsay or stories, are being identified on the map (*e.g.*, Switzerland, Italy and Rome, Greece and Athens, Palestine and Jerusalem). Yet even now to proceed suddenly to the use of a world map or of the globe is unsuitable. Doubtless the

children have seen maps of the world already, and some are probably familiar with them in a superficial way. But before a map of the world can be used geographically the children must realize that it cannot be taken literally as a representation of the earth. Also before such a map can be used for purposes of reference the children must be familiar with the general features which it portrays, at least those connected with the distribution of land- and water-masses.

From the time when they first begin really to consider the earth as a whole the children should 'see' it as a sphere, but not as a classroom globe on a stand. This is only a symbolic thing, a makeshift representation. They should regard the map of the world as a still more inaccurate makeshift, distorted and strained. They have to learn to consider each continent in its world setting, in relation to other land-masses and to water-masses on the spherical earth. Of course, these conceptions and many others akin to them can be acquired only gradually. They must be developed by careful teaching throughout the school life. Nevertheless a suitable start is all-important. That is why no work with world maps or with the globe is suggested before the age of about nine years. To use either before real understanding is beginning to become possible is to create opportunities for misconceptions to arise, and actually to call into being the errors that are so difficult to eradicate later.

There are probably many ways by which the use of world maps and the globe can be suitably introduced, but one method which allows the children's map knowledge as well as their world knowledge to be extended gradually, so that too much of the unfamiliar is not presented at once, is the scheme by which the children 'discover' the world with the explorers. By this time (the children are about nine) they may have developed an interest in things of long ago; though since, as is generally believed by modern educators, the historical 'time-sense' develops considerably later than the geographical 'space-sense' or 'map-sense' it may be assumed that the history has not been much. Nevertheless in this new study history and geography are inseparable. In

fact, it is one of the few pieces of school-learning which can proceed by a sequence similar to that in which the knowledge with which it is concerned was acquired by mankind.

The rest of the present chapter is devoted to a brief account of a study of this type.

Exploring the World

The work is suitable for children aged about nine to ten years. In view of its purpose the course should be taken as early as possible, but, generally speaking, nine years may be regarded as the minimum age at which the necessary mental equipment can be expected. By the age of eight and a half to nine most children begin to show a keen curiosity concerning the rest of the world, a desire to see a map "of the *whole world*," and an interest in travel and adventure.

Among the purposes or reasons for this study are the following:

(i) The children gain gradually and by suitable steps a clear conception of the earth's shape, the distribution of land and water, relative sizes, shapes and positions of the continents and oceans, fuller knowledge concerning the cardinal points, use of scale, etc., and first ideas about latitude and longitude.

(ii) It equips the children with a background of knowledge and understanding which will enable them to begin to use a *first atlas* intelligently by the end of the course.

(iii) It gives, more or less incidentally, some ideas about the variety of geographical conditions found in different parts of the earth's surface (*e.g.*, the winds prevailing in certain parts of the oceans, facts of climate and vegetation in certain areas, etc.). With sufficient care in selecting the facts there should be no risk of giving wrong impressions about the present-day characteristics of the regions concerned.

(iv) It gives interest and enjoyment, for the stories are full of wonder and excitement. The thrill of any popular tale of adventure can be equalled by such true 'world stories'

as those of Bartholomew Dias or Ferdinand Magellan, if told in some detail and with a full appreciation of the situations that arise.

(v) It helps the children to become aware of the greatness of their heritage. It should lead them to realize that the 'world-knowledge' now possessed by mankind has been gained slowly through the ages by men whose vision, courage, and devotion made it possible for them to face hardships and dangers many of which are nowadays unknown or greatly reduced owing to the inventions of modern science, men who worked without the help of much of the equipment that is nowadays *taken for granted* by travellers and explorers.

It is necessary for the children to realize the difficulties entailed by the small size of the ships, dependence on wind and other forces of nature, inadequate means of carrying or obtaining water, food, and other supplies, poverty of navigation instruments, absence of such modern accessories as wireless, aircraft, etc., and, above all, lack of geographical knowledge, whether in map form or otherwise. Many of these facts may be considered to be in the province of history rather than of geography. This is an advantage, for any study which breaks down the arbitrary separation of one school subject from another is to be welcomed. In any case, such historical knowledge is geographically valuable—*e.g.*, as a background against which to consider the geography of modern communications, etc. Literature is also included if studies are made of extracts from Hakluyt, Pigafetta's journal, etc.—possible at least with the more intelligent ten-year-olds. Even in schools not working with an integrated curriculum it has proved suitable to use time allotted to history, geography, and English for work of this kind.

The amount to be included will depend on many factors, such as length of time allowed, nature and extent of reading-matter available for the children, etc. It often proves possible to work through the course satisfactorily in about two terms, but for a full treatment and to allow time for the pursuit of points of interest that arise incidentally a year's

work may prove necessary. At any stage the scope of the work may be widened or contracted according to the teacher's discretion or to the particular interests displayed by the children.

The course must of necessity be fragmentary. At the most it consists merely of a few carefully chosen portions of the story of the world's exploration told and discussed. These portions should in themselves be stories centred as far as possible round great personalities. In planning the sequence of the work it is best to select as central figures the men who stood for important ideas or whose work led to discoveries of great significance, and for the children to hear (or read) the stories of these men told in such a way that though the inevitable gaps in the general narrative are in no way concealed there is a clear sequence, simple and easy to follow, showing the stages by which the "unrolling of the clouds"[1] took place. For the benefit of those who are not familiar with the history of geographical discovery a short review of the course is given below.

Synopsis of the Course

It is possible to start the work with accounts of the ancient Greeks or of the Phœnicians—*i.e.*, at or near the beginning of partially recorded exploration, with the known world centring round the Ægean or the Eastern Mediterranean. Among the reasons against beginning here is the fact that the areas in question do not include the children's own country and the lands and seas round it. It seems more suitable to start at a point when Britain was at least part of the 'known' world. Further, although in the earliest periods there are some great travellers (*e.g.*, Ulysses, Alexander, even Sindbad the Sailor, and others), there is no one figure who offers the wealth of authentic and suitable information needed before Marco Polo. In the time of Marco Polo (late thirteenth century) Britain was more or less correctly mapped in relation to Europe, at least on the *portolani* (maps

[1] M. B. Synge, *A Book of Discovery* (Nelson, 1912).

used by seamen). Indeed, these maps showed the whole Mediterranean and much of Europe with remarkable accuracy. It is therefore justifiable to use an ordinary modern map to show the extent of the world known to Polo's contemporaries. As a general rule it is unwise to use any but modern *correct* maps in the first instance. When the children are sufficiently familiar with these they can study and compare early maps without risk of confusion. Reproductions of ancient maps—for example, the coloured plates of Miss Synge's *Book of Discovery*—are examined by the children with much delight.

The story of Marco Polo can be found both in synopsis and in detail among the books mentioned in the bibliography on p. 95. To understand the story the children need to use a map showing Europe and Asia together. Usually considerable time is spent in discussing this map and in answering children's questions about it.[1] Simple outline maps are needed by the children on which to mark features mentioned by Marco Polo—deserts, mountain-ranges, rivers, etc.—and in particular the position of China and probable line of route taken by Polo on his outward and homeward journeys. These maps should be used to make clear the relative positions of China, India, Japan, etc., and Italy and Britain, etc. Some conception of the enormous distances traversed in crossing Asia may be gained by realizing the length of time spent on the journey, even allowing for a year lost through sickness *en route*. The little party left Italy in November 1271, and reached the Court of the Great Khan in China in May 1275. In some respects the study of a journey of this character may be more effective in creating an impression of the vast extent of the continent than the consideration of a journey over equal distances carried out by modern methods of travel in a few weeks or even a few days.

After the time of Marco Polo there was a great development of the trade in luxuries between the Far East and Europe. Ships from Venice and other European cities went

[1] See the note about maps to be used at the end of this chapter

to the Levant coast to collect the silks and other goods, especially the *spices*, which had been brought partly, or entirely, overland from Persia, India, the Spice Islands, and the (East) Indies. The difficulties associated with this trade, together with the attraction of the wealth to be gained from it, brought about a desire, chiefly among the seamen of certain European countries, to *find a way by sea* to India and the Indies. Though by no means the only one, that ambition became an important spur which urged forward the exploration of the world.

The second great personality round whom the children's stories of exploration may be centred is Henry the Navigator, Prince of Portugal, who set on foot the exploration of the west coast of Africa, and whose work culminated long after his death in the voyage of Vasco da Gama, the first to succeed in reaching the Indies by sea. In the early fifteenth century the west coast of Africa was known only as far south as Cape Bojador, beyond which the perils, real or imaginary, were so great that no man dared to pass it. Through Prince Henry's inspiration and teaching, however, men overcame their fears, and ship after ship was sent out, their commanders instructed to go farther and yet farther, so that gradually the extent and character of the west coast of Africa became known. The story is given to the children only in outline, but there should be sufficient detail for them to realize something of what it meant for men to leave behind them the last headland reached by their predecessors, and to enter seas "where never man sailed before": how the hopes and expectations of their commanders must have been raised when they found the Guinea coast continuing eastward in the desired direction; how this was followed by disappointment which lasted for so long that Prince Henry had been dead twenty-six years when his work achieved a great part of its purpose in the successful rounding of the Cape by Bartholomew Dias. With its associated map-work and the discussions that arise, this narrative gives, more or less incidentally, a preliminary conception of the shape and extent of Africa and some notion of its world position

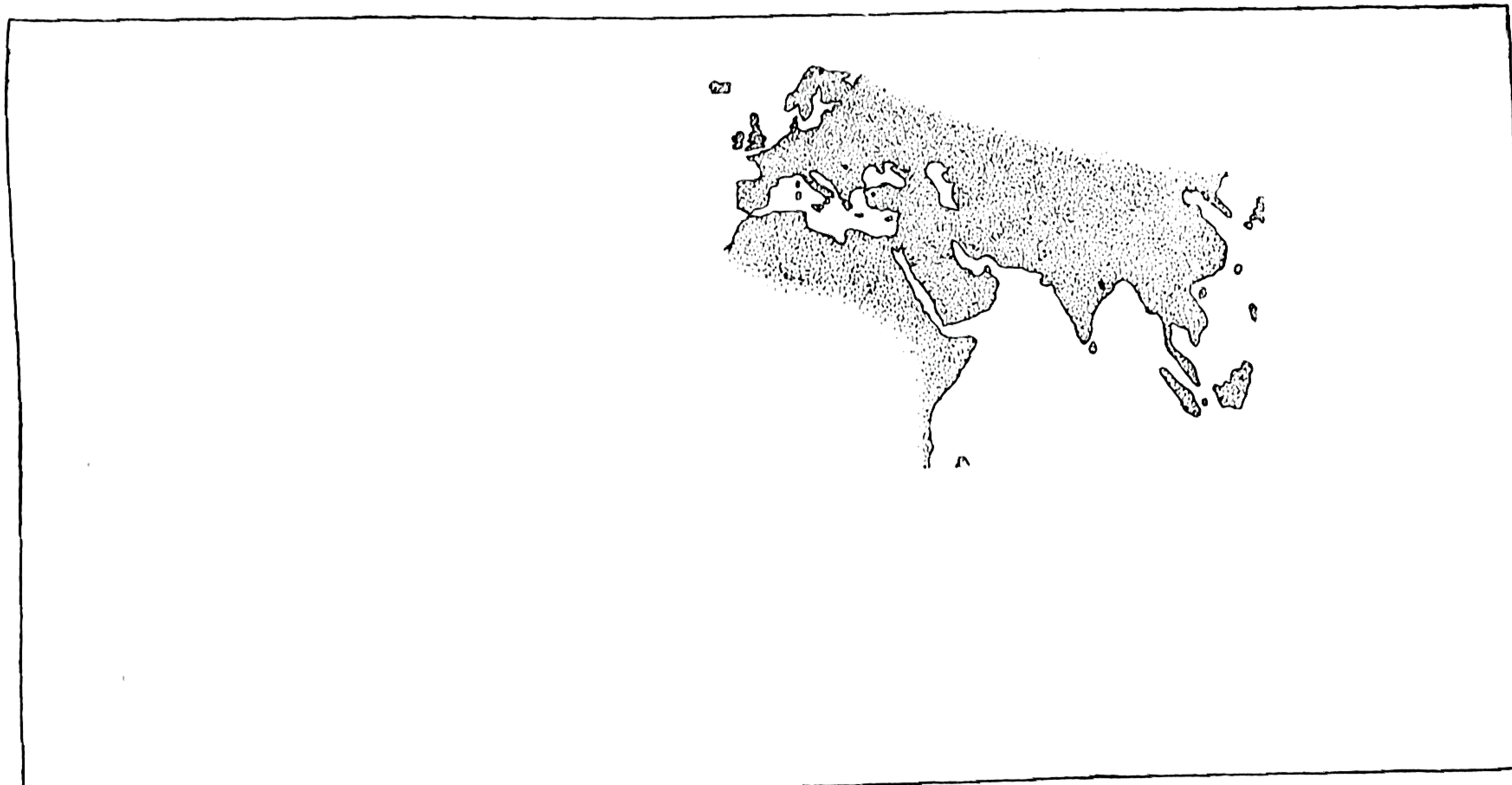


FIG. 15. APPROXIMATE ACTUAL EXTENT OF THE LANDS KNOWN BY HEARSAY OR OTHERWISE AT THE END OF THE THIRTEENTH CENTURY, AFTER THE TRAVELS OF MARCO POLO AND OTHERS

Lands shown are drawn on a fragment of Mollweide's equal-area projection. For completion see Fig. 17.

Adapted from M. B. Synge, "A Book of Discovery," "The Unrolling of the Clouds," Plate III (Nelson), by kind permission of the publishers

as a great barrier in the way of intercourse between East and West (which it continued to be in subsequent history).

Before the final consummation of Prince Henry's work in the voyage of Vasco da Gama to India another man had come forward, and, if tradition is right, had acted upon a yet more wonderful theory. Even before Dias had put to sea in his attempt to find a way *eastward* to India Christopher Columbus is said to have formulated his idea of sailing to the Indies *westward*.[1] Though the lands he actually reached are part of America, Columbus was not aware of this. On one of his four voyages he explored a considerable part of the coast of the mainland of Central America, but he refused to believe that he could not find a way through to the coast of Asia and to India, which he was sure could not be far away. He could not, of course, realize that not only the great American continent, but also the vast width of the Pacific Ocean, lay between the Indies he discovered and the Indies which he sought.

According to tradition, Columbus had seen a map, made by Toscanelli, which showed Europe and Africa facing Japan, China, and the Indies, on opposite sides of the Atlantic, a map which invited a sailor who had courage to lose sight of the land for many days to sail westward to the Indies. Such a map could be made and used only on the assumption that *the earth was round*. It is at this point that the use of a globe first becomes necessary, but preferably, in the first instance, of a plain globe or any large ball on which the world known to Columbus and his contemporaries can be shown. The interest and accuracy is increased if the lands as they are discovered from this stage onward are coloured in on an outline globe or on an old discarded one.

With the story of Columbus comes the need for the children to realize that the earth on which we live is a sphere. No doubt they know already as a verbal statement that the

[1] Although their suggestions are not universally accepted, some recent authorities have doubted that Columbus worked with this idea definitely in mind.

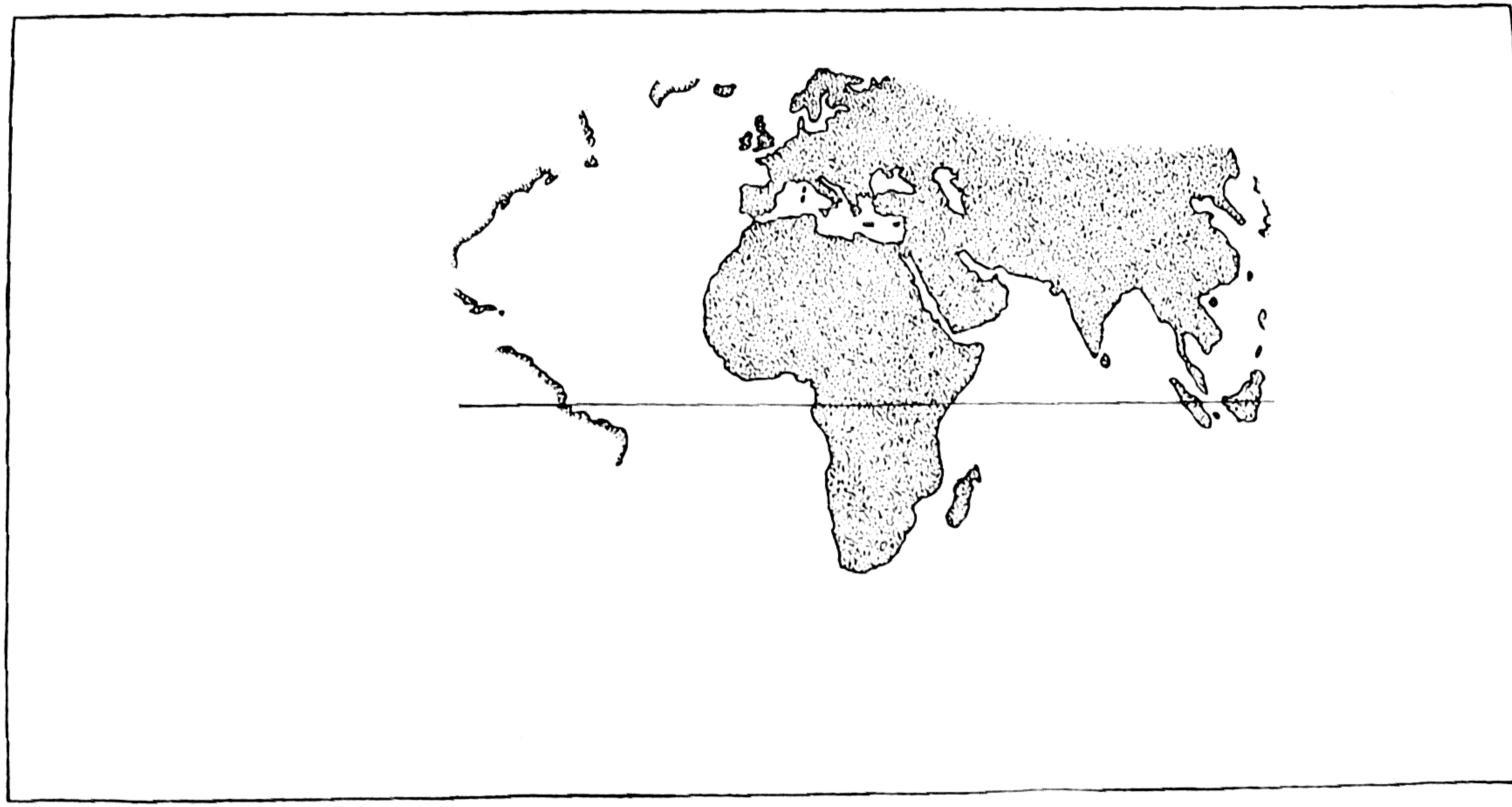


FIG. 16. APPROXIMATE EXTENT OF THE LAND-MASSES OF WHICH AT LEAST THE COASTS WERE DISCOVERED BY A.D. 1500

After the voyages of Columbus, da Gama, Vespucci, Cabral, Cabot, and others. Lands shown are drawn on a fragment of Mollweide's equal-area projection. For completion see Fig. 17.

Adapted from M. B. Synge, "A Book of Discovery," "The Unrolling of the Clouds," Plate IV (Nelson), by kind permission of the publishers

'earth is round.' They have almost certainly seen the school globe before, and have probably developed a keen interest and curiosity concerning it. That is not a reason for assuming that they can understand and use it, though it is a reason for attempting to satisfy and utilize their interest. The conception of the earth as a sphere requires considerable application of the imagination, and at this point it is well to devote plenty of time to a discussion of the spherical earth and to a consideration of some of the characteristics and phenomena that are the result of its roundness. The main purpose at this stage is so to present and discuss the shape of the earth and its symbolic representation by the school globe that from now onward the globe can be used with an understanding that should be capable of developing along the right lines because it has been rightly begun. (For a fuller indication of what is meant here see Chapter V, pp. 96–110.)

Though care should be taken to avoid indicating that conditions found by one navigator are necessarily characteristic, the voyages of Columbus certainly teach the direction and some facts about the distribution of the trade-winds. The voyage of Vasco da Gama similarly emphasizes the Indian monsoons. Facts about ocean currents and certain climatic conditions can be indicated here and there, but can in no way be systematized.

Many explorers and others who followed up the work of Columbus must necessarily be passed over with the mere statement that their work took place, and that gradually it was proved that the lands to which Columbus had found the way were not the Far East, but a 'New World.' Among these explorers was Amerigo Vespucci, after whom the newly found continent was eventually named. One account should be included with some detail—that of Balboa—because of its dramatic presentation of a new fact, the existence beyond the 'New World' of a great ocean, later to be named the Pacific. That ocean was first seen by Balboa from the isthmus in 1513. Six years later there sailed from Seville under Ferdinand Magellan a fleet of five little vessels,

of which one was destined to complete "probably the most important voyage of discovery ever made."

Magellan set out to find a strait that would lead from the Atlantic into the great and unknown sea, and so to the Spice Islands. His expedition was not only successful in this, but it carried out the first circumnavigation of the world. In several respects the story of his achievement is more worth the telling than that of the great English circumnavigator who followed his example. Among facts emphasized by a study of the first part of his voyage is the long southward extension of South America and the cool climate of far southern latitudes. Having passed, amid great peril, through the strait which bears his name, Magellan crossed the Pacific somewhat diagonally through its greatest width. Columbus was thirty-three days in sailing from the Canaries before he sighted the Bahamas, on the other side of the Atlantic. Magellan's ships were three months and twenty days at sea in the Pacific without any opportunity to take in fresh supplies of food. The men ate "biscuit reduced to powder, and full of grubs," leather from the rigging soaked in the sea, and rats, which became a great delicacy, for "enough of them were not to be got." The full story of this voyage indicates very clearly the enormous width of the Pacific as compared with the Atlantic, and that the world is much larger than had been imagined. Moreover, it emphasizes the continuity of the ocean masses, enabling a ship to make her way completely round the earth.

Later exploration led slowly to a fuller knowledge of the shape and extent of South America and North America. There is usually little time to devote to this, to the prolonged search for the North-west Passage, or to the steps by which the interiors of these continents were explored. It is probably more suitable in any case to postpone the stories of exploration in North America till the time when the geography of the continent is studied in later school-work.

A few more outstanding personalities should figure in the course, particularly Captain Cook. The fact that Australia was the last great land-mass (except Antarctica) to be

discovered is an interesting reflection of its geographical position, and a study of Cook's voyages should bring out the isolation both of Australia and of New Zealand. Another point of considerable geographical interest is the fact that Africa, the *first* continent outside Eurasia to be concerned in the voyages of discovery, figures also very near the *end* of the stories of exploration. The world had to wait till the middle of the nineteenth century to learn much about the interior of the continent whose coast was so laboriously studied in the fifteenth. For several centuries Africa as a whole remained little more than an obstacle to be circumnavigated, largely on account of the unattractive conditions along its coasts and the difficulties in the way of penetration. The stories of Livingstone, Stanley, and their successors concern men who were contemporaries of the children's great-grandfathers.

Exploration in our own time has been concerned chiefly with Polar regions. If possible the children might finish the course by a study of a contemporary or recent expedition. Apart from any other value, it serves as an enlightening contrast to the stories that have gone before, and should bring an increased respect for the explorers of the past. An expedition of to-day has at its command a wealth of knowledge and resources in providing equipment and supplies: the advantages of speed and efficiency that come with mechanical transport by land, sea, and air, the confidence brought by a knowledge of the problems to be faced, and the security made possible by wireless communication. For these reasons modern explorers can solve problems and survive dangers beyond the ken of their predecessors.

The coming generation, accustomed to all these advantages in their daily lives, will find it increasingly difficult to imagine the conditions under which the early explorers worked. For that reason alone the study of world exploration should have an increased value educationally. It should prepare the children to see more clearly in perspective the geographical conditions of their own time. (For work forming a suitable continuation from this point see Chapter VI.)

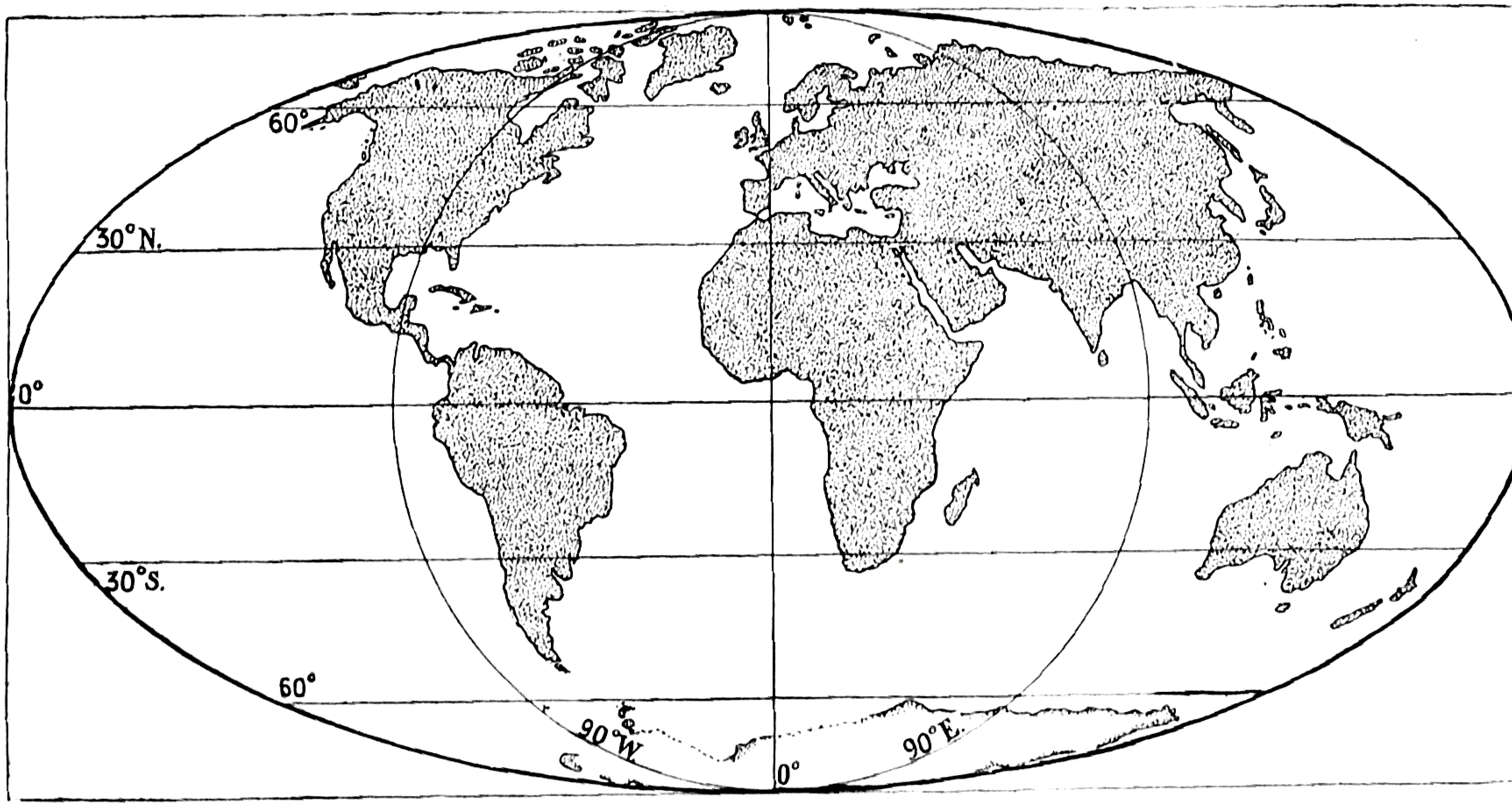


FIG. 17. THE EXTENT OF THE LAND AREAS KNOWN TO-DAY

Mollweide's equal-area projection.

The Maps used in the Course

During a study of this kind the children develop, among other things, their understanding of maps, and they approach the use of a map of the world by a series of easy stages. It is obvious, therefore, that an ordinary printed map of the world will not as a rule be suitable until the end of the course or near to it. In fact, during the very early stages the maps should be of the simplest description—land areas distinguished from water areas by a wash of colour, and marked only with the names required. A wall-map of this kind can be prepared by colouring an outline printed on cartridge-paper[1] (as supplied by George Philip and Son, Ltd, and other publishers). The whole map can be covered by a sheet of plain paper, which is cut away at each successive stage (*cf.* "The Unrolling of the Clouds" in Miss Synge's *Book of Discovery*).

Individual map-work by the children should illustrate the growth of the known world as the stories proceed. Experience suggests that the most satisfactory method of providing for this map-work is for the teacher to make duplicated copies of the appropriate map at each stage, using the *same scale* and *same projection* throughout (*cf.* Figs. 15–17), and preferably on paper of uniform size.[2] Otherwise comparison between the maps becomes practically impossible. The children's maps should also be on the same projection as the teacher's wall-map. They should show simply the outline, with a very few names marked for guidance. The children colour the land areas to distinguish them from the sea, and then mark and name the appropriate additional features for each map. It is often surprising to the young teacher to discover how difficult (and therefore how necessary) for some children is this problem of distinguishing land from sea—*i.e.*, remembering and recognizing the land shapes,

[1] For the projection to use see pp. 115–117.

[2] Hand-maps (approximately foolscap size) as supplied by Messrs Edward Stanford, Ltd, George Philip and Son, Ltd, and other firms provide suitable outline maps of the world from which maps can be made for duplicating to meet the requirements of the work.

etc. Many and frequent are the references to the classroom copy to find out "which is land." Nevertheless pleasure is taken in colouring a map, and the working familiarity with the map which it gives makes it worth the time spent.

SOME USEFUL BOOKS

ANSON, P. F.: *Fishermen and Fishing Ways* (Harrap, 1932).

GRAHAM, M.: *The Fish Gate* (Faber, 1943).

BAKER, J. N. L.: *A History of Geographical Discovery and Exploration* (Harrap, new edition, 1937). Contains innumerable further references.

BEAZLEY, C. R.: *Prince Henry the Navigator* (Putnam, 1923).

BRENDON, J. A.: *Great Navigators and Discoverers* (Harrap, 1929).

DICKINSON, R. E., and HOWARTH, O. J. R.: *The Making of Geography* (Oxford University Press, 1933).

Hakluyt Society publications—*e.g.*, Lord Stanley of Alderley (ed.), *The First Voyage round the World by Magellan.*

HARLOW, V. T.: *Voyages of Great Pioneers* (Oxford University Press, 1929).

JONES, J.: *Geography by Discovery* (Sidgwick and Jackson, 1920).

MARMER, H. A.: *The Sea* (Appleton, 1930).

ROGERS, S.: *The Atlantic; The Pacific; The Indian Ocean* (Harrap, 1930, 1931, 1932).

STEFANSSON, V.: *Great Adventures and Explorations* (Hale, 1947).

SYKES, SIR PERCY: *A History of Exploration from the Earliest Times to the Present Day* (Routledge, 1934).

SYNGE, M. B.: *A Book of Discovery* (Nelson, 1912).

BUCHAN, JOHN: *The Last Secrets* (Nelson, 1931).

MORISON, S. E.: *Christopher Columbus* (Oxford University Press, 1942).

WOOD, H. O.: *Exploration and Discovery* (Hutchinson, 1951).

FOR CHILDREN'S READING

KELTIE, SIR JOHN SCOTT, and GILMOUR, S. C.: *Adventures of Exploration* (especially Book I: "Finding the Continents") (Philip, 1926).

The Romance of Exploration (Modern World Press) includes brief accounts of many expeditions up to 1932.

BOOG-WATSON, E. J., and CARRUTHERS, J. I.: *West of the Moon* and *Beyond the Sunset* (Oxford University Press).

GARNETT, O.: *Exploring the World.* "The Discovery Books," Book III (Blackwell, 1953). Gives further references.

CHAPTER V

INTRODUCTION TO THE USE OF GLOBE AND ATLAS

BEFORE proceeding to discuss schemes of work for children from the age of nine years it seems best to consider more fully the understanding of globes and maps which the children should now be acquiring, and which was referred to in the previous chapter.

THE GLOBE AND THE MAP OF THE WORLD

The Conception of a Spherical Earth

If they approach the use of the globe in the right way and at the right time most children find no great difficulty in understanding it. Unfortunately it is seldom possible under usual school conditions to consider children entirely as individuals, at least where such matters as using the globe are concerned, and therefore it is generally the case that a certain number of children in a given class do not find the conception of a spherical earth represented by the school globe as easy as do the majority. The lack of full understanding remains unvoiced by such children as a rule, partly because it is merely a vagueness and a lack of conviction which they would find difficult to express. It is often revealed, however, even in much later work, by the mere turn of a phrase. The teacher should remember also that to handle a globe, to talk about it with facility, is not necessarily to 'see through' its symbolism to the real earth.

That the earth is round, as a statement of fact, is known to the least educated person, even including the child of seven who is too young to use the globe (at least as a piece of apparatus for geographical study). To see ourselves as inhabitants of a spherical earth does not come so easily, and

to think of the people of New Zealand as inhabiting the same spherical earth with the same degree of security that we ourselves enjoy presents an almost insuperable difficulty for some children, if not for older persons. Probably the most common of the more obvious difficulties is this inability to see why people in high southern latitudes "don't fall off." These misconceptions are generally brought into being by unenlightened or careless teaching in the junior school, where one of the aims of the work should be to prevent them from taking form. To show children a globe—a tangible object in a fixed position *with* a top and a bottom—and to state that it shows "what the earth is like," is to invite misconceptions, particularly if there has been no preliminary work and the children are younger than nine or ten years.

It is best to introduce the idea of a round earth by appealing *first* to the imagination. Only when the real earth on which we live (and over which ships sail and aeroplanes fly) has been 'seen' in imagination as an enormous sphere, should a spherical object be used for demonstration. This in the first instance should not be a globe, but the largest possible ball. A football may at first cause a smile of amusement, but its makeshift character is exactly what is needed to convey the fact that it is something which *stands for* the earth. The ball has the great advantage that it can be held in any position. It has no top and no bottom—no part that is even usually at the top. Of course, the globe is a similar representation of the earth, but it is less obviously a makeshift—*i.e.*, employed because it is impossible to use the real thing. The perfection of its manufacture, its mysterious markings and attachments, all make the globe appear an object to be studied as a thing of interest *in itself*. Its symbolic nature is lost sight of. Thought (and speech) is too much concerned with 'the globe,' and too little with 'the earth' for which it stands.

When the globe is first used, and occasionally afterwards, it is as well to take it from its fixtures, or to use an old globe permanently removed from the stand for this and other purposes. A discarded globe should have the holes for the

axis-rod filled in, and be painted so that the land and sea stand out clearly in white and black.[1] It proves useful in many ways besides that under consideration. To use the globe in *any* position at the very beginning indicates that there is no 'right way up.' Very soon the main purpose of the stand, as a means of holding the globe conveniently (and securely), becomes apparent to the children, for greater care is needed in dealing with a free globe!

The first globe used should be one which shows only the minimum essentials—land areas and sea areas—preferably a slate-surface globe, with land areas in white and sea areas in black.[2] There should be no names, no colouring for political divisions or for relief, no latitude or longitude lines. The globe should be as large as possible. The larger the globe the easier does it become to realize that its curved surface represents the curved surface of the earth on which we live; it is more nearly possible to think of the earth and of the globe in the same mind. The diminutive size of a small hand-globe hinders the mind in its attempt to imagine an immense earth. Nevertheless in later work every pupil should possess and use his own small globe.

To reconcile the known roundness with the apparent flatness of the earth it is not quite sufficient to say that the round earth is so big that its surface looks flat. There are occasions when the roundness of the earth can be seen. It is usual in this connexion to refer to the appearance of ships just beyond the horizon at sea, when the bulge or curvature of the earth cuts off the hull of a ship which lies below the observer's horizon, so that nothing lower than the masts, or, if the vessel is farther away, only the smoke, may be visible to the observer. On a very clear day at sea, when the horizon-line is sharply defined, it marks the limit (about

[1] If the ordinary globe is removed from the stand the difficulty of refixing it can be overcome quickly by placing the eye close to the hole at the North Pole. The tip of the rod inside can be seen till it reaches the hole.

[2] As supplied by George Philip and Son, Ltd., 32 Fleet Street, London, E.C.4, who will also make a globe that is simply a ball, with no axis. It can be supported on a shallow ring. The same firm now make a globe which can be detached from its stand for use as a free globe.

three miles at sea-level) to which the curved surface of the earth allows us to see. A telescope does not enable us to see anything that lies beyond our horizon. By climbing to the top of the cliffs or to the crow's nest on board ship it becomes possible to see farther, but still there is an horizon-line marking the limit of vision, no matter how clear the atmosphere or how powerful the telescope (see Fig. 18).

Knowing this, it becomes possible for us to 'see' the area bounded by our horizon not as a plane, but as a gently curving surface which bends away from us in all directions. If we travel to a spot actually on that horizon, out at sea, there we find a similar horizon-line, equally far away, and on reaching a spot on the last horizon-line we find yet another, made by the same constant curvature of the earth. On land, where completely level country is found, the same

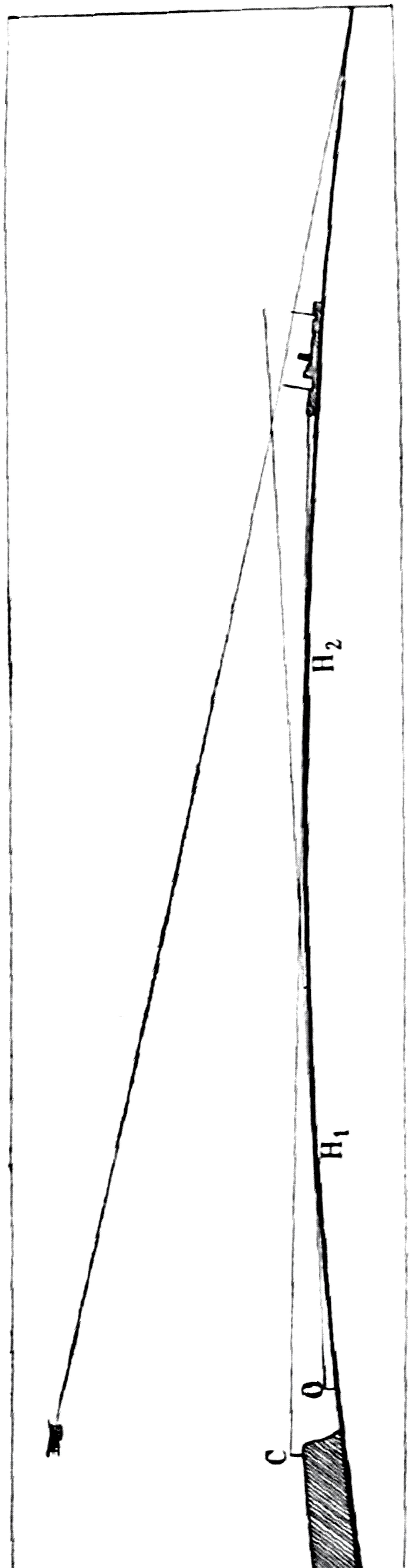


FIG. 18. DIAGRAM WHICH HELPS CHILDREN TO UNDERSTAND THAT THE SURFACE OF THE EARTH IS CURVED

The observer on the beach at O can see no farther than his horizon at H$_1$. If he ascends to the cliff-top at C his horizon is extended to H$_2$, and he can see the funnels of a ship which lies actually beyond the horizon, but which could not be seen at all from O. An observer in a seaplane flying over C and O can see the whole ship—and far beyond it. *N.B.* In such a diagram as this the size of the objects sketched and the curvature of the earth's surface are inevitably grossly exaggerated in relation to distances represented.

conditions hold good, but the land is seldom flat enough over a sufficient area for the horizon to be observed in this way on land. Moreover, for many town children the seaside is the only place where they have an opportunity to behold even a fragment of open horizon. It is therefore better to carry out the explanation by reference to the sea, but the *possibility* of finding the conditions on land should not be ignored. (Children who have never seen the sea can gain something from pictures and verbal accounts.) The imagination is greatly helped if the blackboard diagrams explaining the relation of the horizon to the curvature of the earth are drawn so that the earth's surface is shown by a line of the gentlest possible curvature, and utilizing the full width of the blackboard (*cf.* Fig. 19*a*).[1]

If in imagination we carry the gentle curvature revealed by the horizon on and on, till an infinite number of horizons have been passed, we can complete the whole circumference of the earth—but never are we upside-down! The 'falling off' or 'upside-down' difficulty should never occur if at the very beginning the real earth is considered in this way *before* the globe is used and while it is in use, and also if the children see from the very beginning that the globe has no 'right way up.' If necessary it must be pointed out that *down* is always 'towards the centre of the earth,' below our feet, and *up* is always 'away from the centre of the earth.' To fall is to move with the pull of gravity *towards* the earth, even in South Africa or New Zealand!

First Ideas about Latitude and Longitude

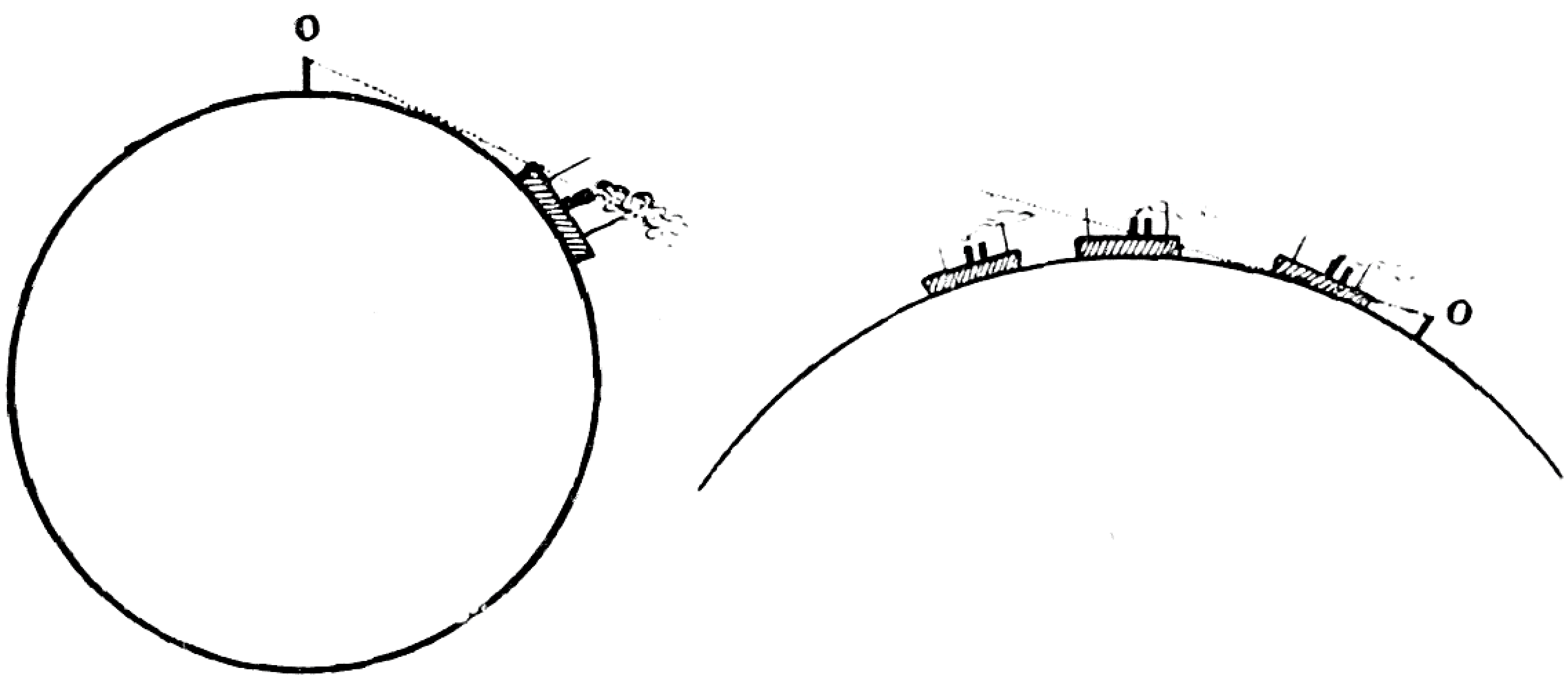
Generally the globe has not been in use very long before the necessity for fixing positions upon it arises. A need is

[1] To show that the horizon indicates a curved surface is not to *prove* that the earth is a sphere. It might still be shaped like an egg. Proof of its spherical shape is to be found in the shadows it casts on the moon during eclipses of the moon. The earth's shadow always has a circular margin, no matter which part of the earth is turned to the moon. This could not be true of any object that is not a sphere. For other facts in this connexion see J. Fairgrieve and E. Young, *Human Geographies* (Philip, 1928), Secondary Series, Book III, Appendix II: "The Shape of the Earth."

felt for points to measure from and for terms for the directions in which to measure. The children are already familiar with the cardinal points used in the field and in connexion

FIG. 19*a*. EXAMPLE OF THE KIND OF DIAGRAM WHICH USUALLY HELPS A CHILD TO SEE THE SURFACE OF THE EARTH AS HE KNOWS IT AS PART OF THE SURFACE OF A SPHERE

The continuation of the curve to make the complete circumference of an enormous sphere can be safely left to the imagination. Ships A_1 and B_1 are drawn first. It is clear that neither can be seen from the deck of the other. If the ships sail towards each other the sailors on the deck of each ship can see the other when the ships reach points A_2 and B_2. The dotted line represents the line of sight between the ships at A_2 and B_2. It is extended to show that A_1 cannot be seen from B_2, nor B_1 from A_2.



FIGS. 19*b*. AND 19*c*. EXAMPLES OF THE TYPE OF DIAGRAM WHICH IS APT TO HINDER RATHER THAN TO HELP A CHILD'S CONCEPTION OF THE EARTH AS A SPHERE

The diagrams do not suggest an *immense* sphere; moreover, they actually call for the 'falling off' difficulty. A child does not find it easy to see in them a representation of the earth as he knows it. The diagrams would be quite suitable if the earth's surface were represented by a very gentle curve, making the proportions less grotesque. Fig. 19*b* is intended to show how the smoke of a ship which is 'hull down' may be visible to an observer. Fig. 19*c*. is intended to show how a ship sailing away from an observer disappears hull first.

with large-scale maps and maps of Britain, etc. The cardinal points as applied to the globe present a new problem, and this, together with the problem of fixing or describing positions, leads directly to the subject of latitude and longitude.

A child who will shortly be required to use an atlas should have some correct ideas about the meaning of latitude and

longitude He cannot use the globe intelligently if he remains mystified by the lines upon it. Moreover, he has probably already heard (and used) such terms as 'North Pole,' 'South Pole,' and 'equator.' By the time he is eleven years of age he should have acquired a rudimentary working conception of what is meant by them.

Children of about nine years generally know already that the earth is continually spinning round. By demonstrating with the free globe mentioned on p. 97 it can be shown that there is any number of ways in which this spinning might take place. There is, however, only one way in which the earth actually does revolve. This can be demonstrated by a member of the class holding the free globe by means of fingers placed at each pole, while another turns the globe round. The spinning then takes place round an imaginary line joining the poles through the centre of the earth—the axis. There is no departure from truth at this juncture if the axis is held horizontally or in any other position. The spinning of the earth remains the same: a spinning from west to east round an imaginary line that passes through the centre of the earth and comes to the surface at points which are fixed and constant—the farthest south and the farthest north points—*i.e.*, the poles. In order that they may show this spinning conveniently our classroom globes are made with an axis-rod running through the centre. The tilt of the axis (in relation to the plane of the earth's orbit) is better explained at a later age.

Children aged about ten usually discover that local time in distant lands is different from our own, and when an incident, such as an item on the radio, brings the fact home to them they may ask the reason for it. If they have already made the right sort of acquaintance with the globe children of this age can understand a simple demonstration to show how daylight and darkness come in succession during the twenty-four hours to different parts of the rotating earth. This is best done by playing the shaft of light from a lantern upon the globe in a darkened room, the globe being placed in the equinox position, the division between daylight and

darkness passing through both poles. Pins fixed vertically to the surface at, say, London and Winnipeg, will throw shadows; and as the globe turns round from west to east the shadows of each pin behave like the shadows of the post mentioned on page 53. It becomes quite clear that at noon in Winnipeg it is almost evening in London, and so on. The shortest shadow at each place points towards the pole. It is, in fact, a north line on the globe—a meridian. Many facts can be learned from a leisurely study of this demonstration, among them that all meridians must meet at the pole. After a study of this kind a class aged about ten worked out a diagram which represented both a twenty-four-hour clock-face and a map of the northern hemisphere with the pole in the middle. To the children the meridians were quite obviously both time lines and north lines. (See Fig. 20.)

Latitude lines are taught as east–west lines, crossing the meridians at right angles. They are the lines along which an observer looks towards the sun at sunrise and sunset at the equinox. With the globe in the equinox position, a pin standing vertically on one particular latitude line will, at noon, simply throw the shadow of its own head. This latitude line is the equator, the line which bisects each meridian. The point cannot be too strongly emphasized that in this, as in all other work with the globe, the children should be helped to keep in mind that the globe represents the *real earth*. Their vigorous imagination is something to be appealed to and relied on. A child of ten who saw a pin standing in the shadow of its own head 'at noon' on the globe in the Gulf of Guinea needed only the reference to a sailor on the deck of a ship in that position, to remark, "There would be only the shadow of his fat part round his feet."

It helps children to realize the imaginary nature of lines of latitude and longitude if they watch them being drawn on a plain slate surface globe or on a football. The children should also learn that there are 180 meridians east and west of 0° (which is continued by longitude 180° on the far side of the earth), and that the parallels of latitude are numbered

both northward and southward from 0°, the equator (the longest of the lines of latitude), to the pole, 90° (which is simply a point).

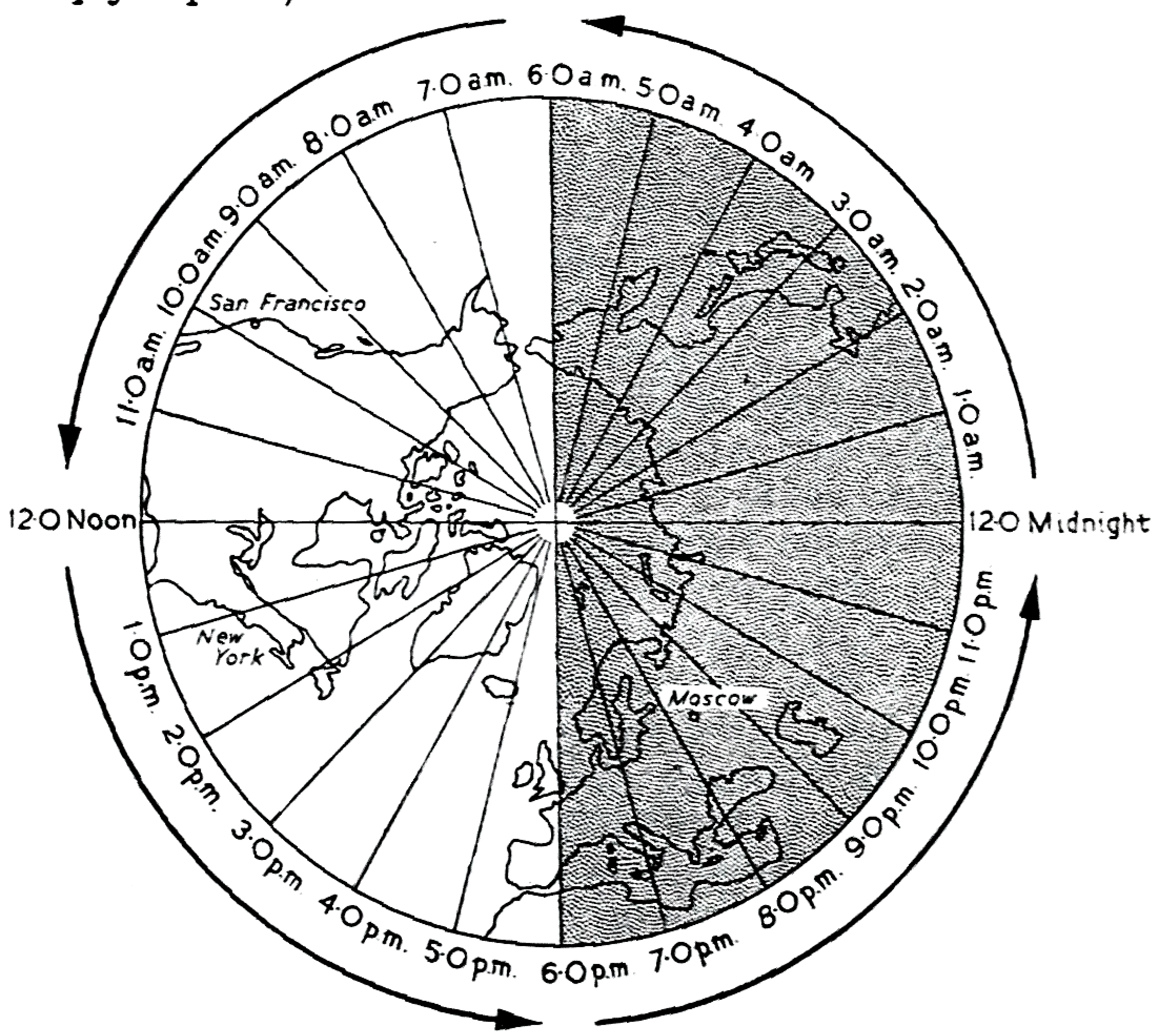


FIG. 20. LONGITUDE AND TIME

Arrows show the direction in which the earth turns. Shading shows area of 'darkness' at the equinox. There would, of course, be a little light before 6.0 A.M. and after 6.0 P.M.

At 6.0 P.M. in Britain it is morning in San Francisco, 'dinner' time in New York, and 'bed time' in Moscow.

If the time lines are drawn on a circle of tracing-paper which can be rotated over a corresponding map the times at other places can be found for any time in Britain.

The ideas indicated above, and others in the same category, are gained incidentally during many lessons and over a considerable time. A teacher who knows the subject and the children will be ready both to wait for the opportunities the children give him and to see these opportunities when they occur. He will not expect to teach too much at once, but will be guided by the children's questions and comments.

His purpose will be to give the children a working basis of knowledge, helping them to see what lines of latitude and longitude are before they begin to use them. Above all, the children should never learn definitions parrot-wise. Before the mental age of twelve such terms as *Tropic* and *Arctic Circle*—in fact, anything that cannot be demonstrated with the globe in the equinox position—should not be introduced. To understand latitude and longitude mathematically is, of course, possible only at a much later stage.

The Distribution of Land and Water

Familiarity with these essential facts about latitude and longitude is needed immediately by the children to acquire and to express knowledge about the distribution of the land- and sea-masses over the earth's surface. Some of the important facts to be learned in this connexion have been indicated in the previous chapter. The following are examples of other facts in the same category which should be formulated not as statements made and demonstrated by the teacher, but as points of interest which have come to light through the children's own observations:

(i) There is an almost continuous ring of lands round the Arctic Sea.

(ii) There is a continuous belt of sea in high southern latitudes, round the Antarctic continent.

(iii) On the whole the land-masses are wider in their northern parts and taper southward.

(iv) The continents of the Northern Hemisphere extend much farther poleward than those of the Southern Hemisphere, with the exception of Antarctica.

(v) Of all the southern continents South America stretches farthest southward, except Antarctica.

Attention should be paid to the obvious facts about shapes and comparative sizes of land- and sea-masses. The position of all the continents in relation to the equator should be realized fairly early in the school course. Some important

aspects of the distribution of land and water often receive insufficient attention in school-work. For example, not only children, but many students who have completed a school geography course, are not fully aware of the eastward position of South America in relation to North America—that the whole of the former lies farther east than all but a small part of the latter, and that Chicago, for example, is farther west than any part of South America. A similar point is that of the eastward bulge of South America, which, opposed to the westward bulge of Africa (though in a different latitude), causes a marked narrowing of the Atlantic that is proving of importance in the development of air-routes.

No similar narrowing is found in the Pacific, which is, in fact, of such enormous width that, as any child can see from the globe, it extends in its widest part for more than one-third of the world's circumference. The great width of the Pacific should not be observed with surprise, as is often the case, by students who have taken an ordinary school geography course. The explanation for a general vagueness on this point is probably to be found in an insufficient reference to the globe and an excessive or unenlightened use of world maps of the usual kind, showing longitude 0 near the middle of the map and the Pacific separated into two parts at the margins. It is, of course, necessary to make maps which do not break up the land-masses, and therefore most world maps will always be made with the 'cut' running through the Pacific. Every good atlas should, however, contain one world map with the Pacific in the centre, as in Fig. 21 or 23. Moreover, all geography should be taught so that the children understand that a problem which necessitates reference to a world map generally requires reference to a globe, if it is to be approached with a true knowledge of the facts.

The Globe rather than the Map

A great many mistaken impressions are gained from the use of maps without reference to the globe. One of the important reasons why children should use the globe before

they use maps of the world lies in the fact that no map of the world can be anything but a distorted representation. Impressions gained in childhood are apt to be strong and

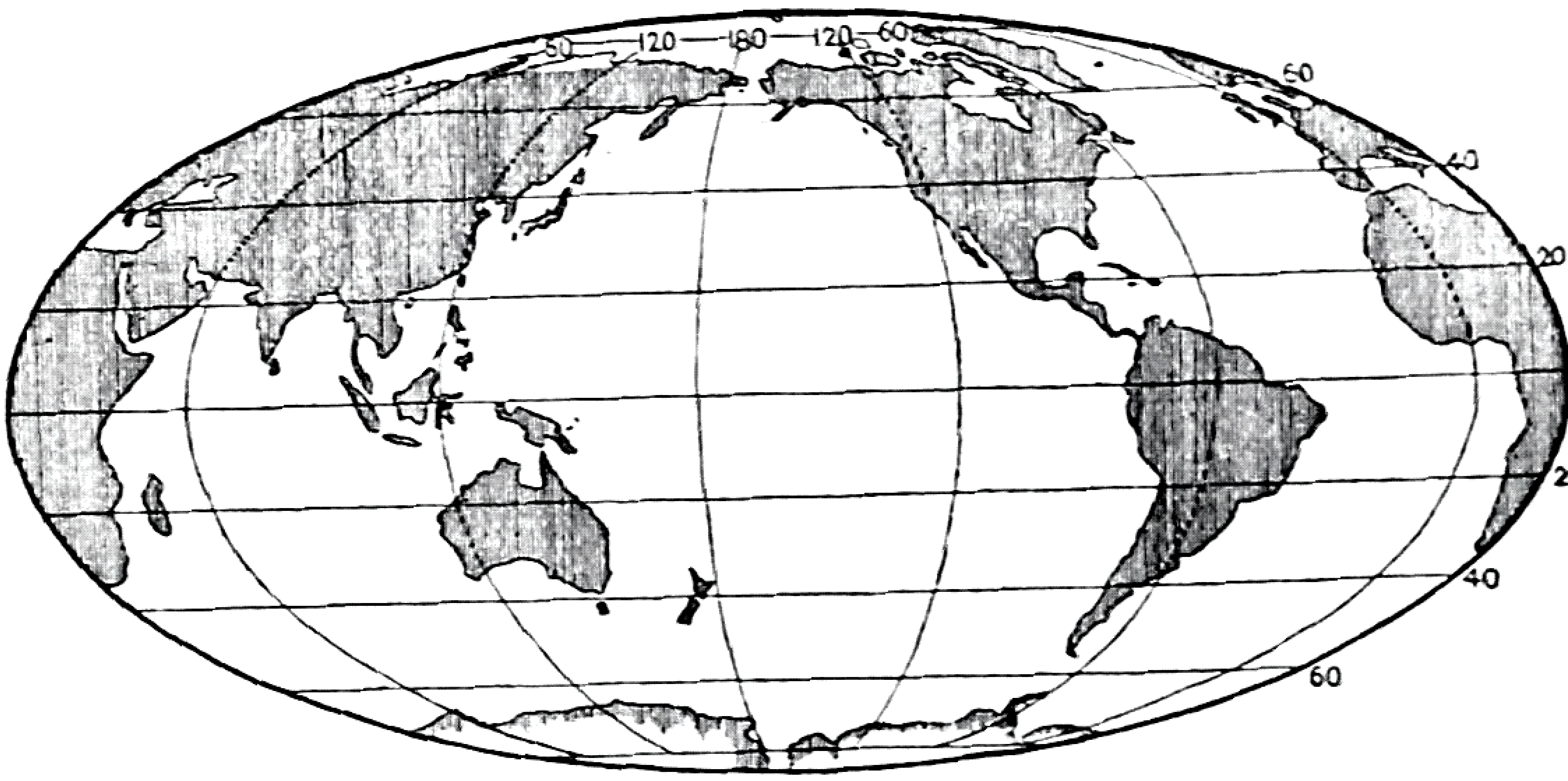


FIG. 21. MAP OF THE WORLD ON MOLLWEIDE'S PROJECTION TO SHOW THE PACIFIC OCEAN ENTIRE

Since this projection represents areas correctly in proportion the map can be used to compare the size of the Pacific Ocean with the sizes of other oceans and of the land-masses around it. Children's world maps should not be limited to those which cut the Pacific Ocean in two. The distortion of shape at the margins makes this map unsuitable for any purpose concerning the land hemisphere. (*Cf* Fig. 17 and see also Fig. 23.)

permanent. This is probably why many a grown-up, who really knows better, continues to think of Australia as lying at the bottom right-hand corner of a rectangular world!

An educated person in an air age should be familiar with a globe, preferably one that can be placed with any part uppermost. Only on a globe can the direct routes by air, between all possible places, be truly shown as direct routes whose distances may easily be compared. Fig. 22 shows the direct (or *great circle*) route *from London* to any other place on the map by a straight line whose length is true to scale. The direct route by air to New York is shown passing over Ireland and Newfoundland, that to Winnipeg[1] over the southern tip of Greenland and across Hudson Bay—and their lengths may be compared with confidence. If the same routes were shown on the map in Fig. 23 they would appear

[1] Not, of course, the route actually used in this case.

to be quite roundabout, a fact which illustrates the need to refer either to the globe, or to a map like that in Fig. 22, when seeking to discover the shortest route between two distant places. But, if great circle routes radiating from

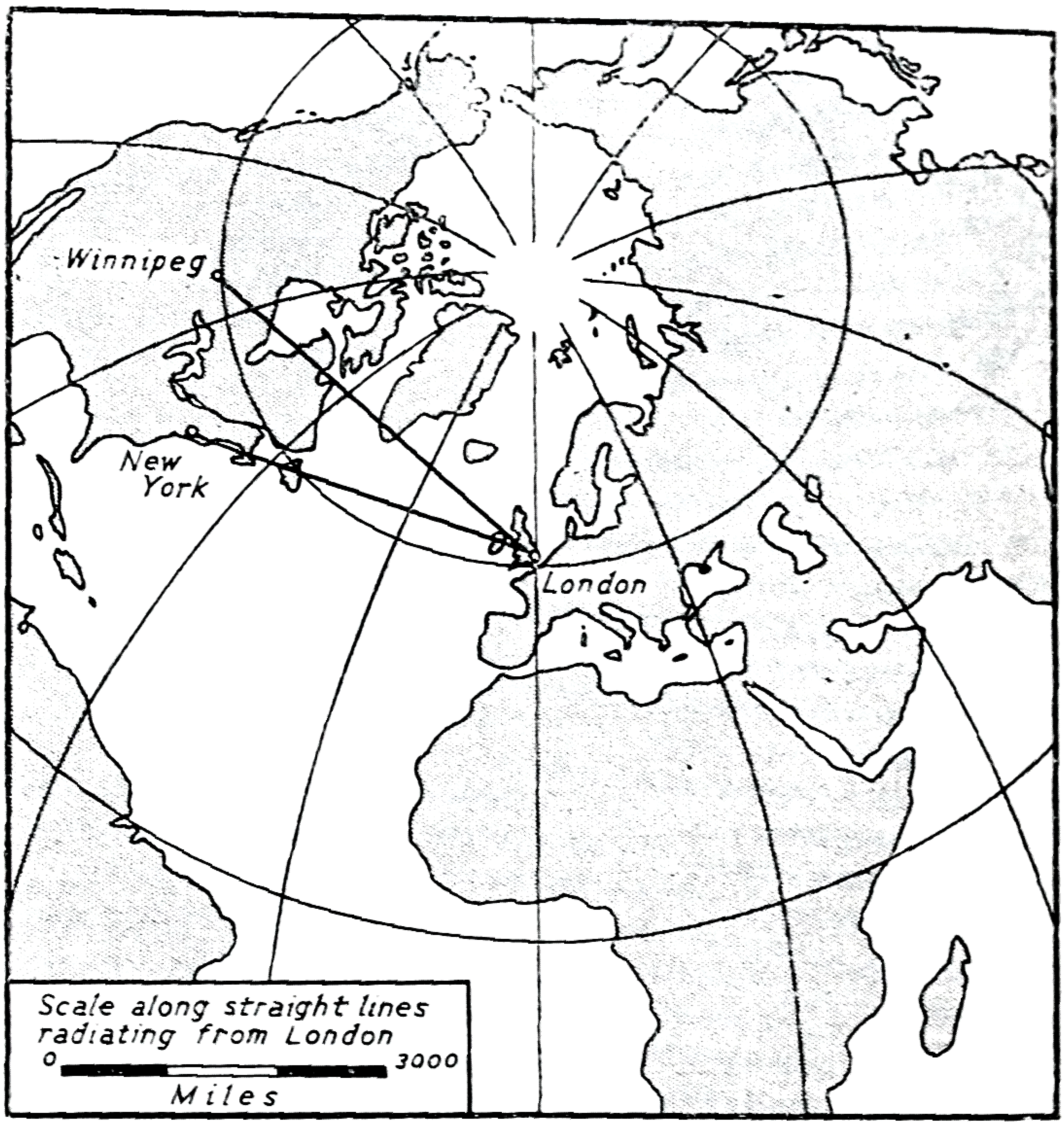


FIG. 22. A MAP THAT SHOWS ALL DIRECT ROUTES (GREAT CIRCLES) FROM LONDON AS STRAIGHT LINES (ZENITHAL EQUIDISTANT PROJECTION)

The scale is true only along lines radiating from London.

any *other* place than London are to be discovered and measured from a map, another map of the same 'kind' (zenithal equidistant projection) must be obtained, centring

on that place. Although maps of this type are beginning to appear in atlases,[1] it is clear that no atlas can include more than a limited number of them, and, in any case, no one of them can show more than a part of the earth's surface without too great distortion. The fact must also be stressed that airmen do *not* use maps like that in Fig. 20 when actually flying! (See p. 115.)

The simplest way to discover and measure direct routes between *any* places thousands of miles apart is to use a globe and a flexible ruler, or merely a piece of string. The flexible ruler (or string) should be graduated in, say, thousands of miles, according to the scale of the globe. In practice it is easiest to make scratches (with a needle) at the correct distances apart, on the clear central band of an ordinary transparent ruler; darken the scratches with indian ink, and attach a label to the ruler stating the unit of length represented by the distance between the marks. Equipped with this, children of all ages from ten upward can discover many facts about the relative positions of places, the distances across continents and oceans, relative positions and extent of continents, countries, mountain ranges, etc., on the spherical earth. In fact, they begin to acquire some of the background of knowledge needed by anyone who is to understand not only modern communications[2] by air and sea, but also many present-day questions, political and strategic.

The Use of the Globe in Practice

The above example must suffice to illustrate the care with which maps of the world should be used, and the need for

[1] There is one in the latest edition of *Study Atlas* (Collins-Longman). An interesting wall-map is *The Air Age Map of the World, centred on London*, compiled by the British Overseas Airways Corporation, published by Stanford in 1947. This shows the whole world, with inevitable distortion of Australia and New Zealand, which, being near the margin, become almost unrecognizable; for the antipodes of London, actually a point, is represented by the circular margin of the map.

[2] For further facts related to this, and other points mentioned here see E. G. R. Taylor, *Geography of an Air Age* (Oxford University Press, 1945), and Balchin, W. G. V., *Air Transport and Geography* (Murray, 1947).

constant reference to the globe. It also indicates the necessity for detailed examination of the globe by every child. Too often in the past the teacher has been the only person to handle the globe, or even to see it close at hand. Too often also the globe has been present in the classroom merely for the duration of the geography lesson. The children's work should be so organized that individuals have the opportunity of making full acquaintance with the globe by studying it independently, satisfying their natural curiosity, and acquiring exact knowledge by the only practicable way to do so—*i.e.*, by each child having the globe to himself for a space of time, and finding it available occasionally at other times than during lessons. The very nature of the globe itself often makes it impossible for all members of a large class to observe a given point simultaneously. Some schools are able to provide each child with a small globe, but, excellent though this is, it does not dispense with the need occasionally for free access to a *large* globe. For the more detailed studies by older children a small hand-globe may be of less value than the large printed globe, with its fuller equipment of names, etc. In fact, it would be an advantage if the map of the world which adorns the wall of many a classroom were replaced by a globe standing or hanging where children may have free access to it.

Apart from the slate-surface globe in black and white, already referred to, which should be considered an essential, the most suitable globe for general purposes is one that can be used for reference in a variety of connexions. It should show the following features: Latitude and longitude (lines numbered); relief represented by layer colouring, not by a modelled surface,[1] political boundaries (if another globe coloured to show political divisions is not also available); names of countries, the most important cities, oceans, seas, etc.; the lines of important shipping-routes; and, in the near future, probably the chief air-routes should be included.

[1] A relief globe may 'look real,' but is therefore all the more misleading, since the highest mountain ranges would not be noticeable on it if they were true to scale.

First Ideas about Map Projections

As early as possible every child should become aware of the fact that no map can give in every respect a true representation of the surface of the whole earth, or of any large portion of it. A child grasps this more easily and

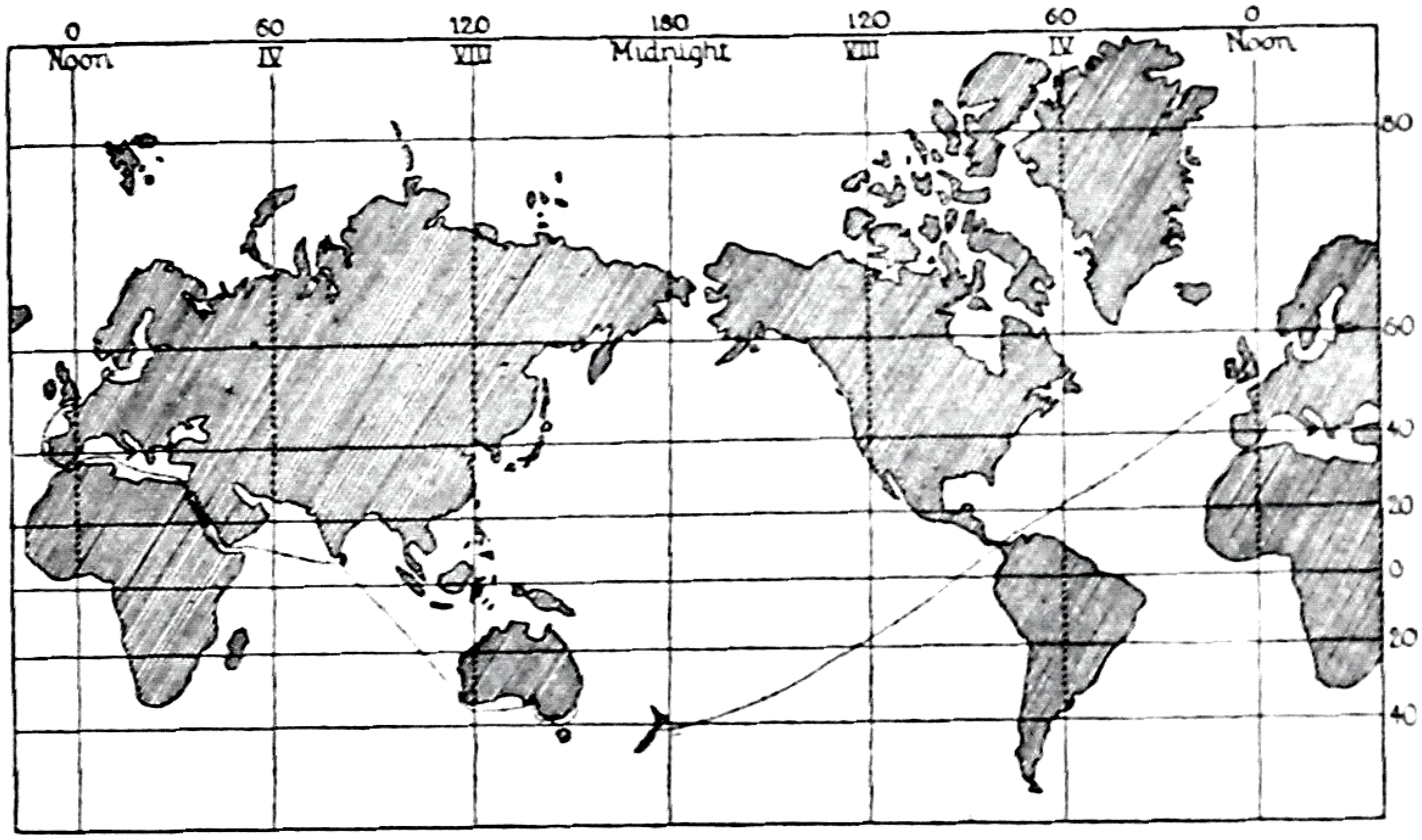


FIG. 23. MAP OF THE WORLD ON MERCATOR'S PROJECTION

To show (i) *times* when noon at Greenwich; (ii) *the sea-routes via Suez to Australia* and *via Panama to New Zealand*. A projection with straight meridians is best for (i) above. (The same meridians are marked on Mollweide's projection in Fig. 21.) Only cylindrical projection, of which Mercator's is an example, can be used to show parts of the world twice over on east and west sides of the map, as above.

completely if he has become acquainted with lines of latitude and longitude on the globe in the first instance. He is now in a position to find out for himself that maps of the world show these lines in many different ways, but inevitably wrongly in one respect or more. (This is another reason for giving at the earliest suitable opportunity that rudimentary knowledge of latitude and longitude outlined on pp. 100–105.)

By examining a map of the world on Mercator's projection—*e.g.*, Fig. 23—the children should discover that it keeps the lines of longitude parallel to one another, instead of letting them converge to meet at the poles; that for this reason distances between east and west appear increasingly

too great as one passes poleward from middle latitudes; that areas in high latitudes appear greatly exaggerated, because, in addition to longitude, the latitude lines are drawn increasingly 'too wide' apart the nearer they lie to the pole. In this connexion it is useful to compare the relative sizes of Greenland and South America as represented by Mercator's projection and as they appear, correctly, on the globe. If other maps in the atlas are then examined and compared with the globe and with one another the children become aware that there are many ways of attempting to show the network of latitude and longitude lines on flat paper. In short, they realize the existence of map projections, though as yet they may not use the term. (When the term is used it is suitable for the children to refer to the names of the projections printed below the maps in a good atlas.) There is no necessity for the children to understand *how* projections are made. The slower members of the class will probably be confused by the usual discussion of cones and cylinders at this stage, though some simple exercises by which a fuller understanding can be gained by older children may occasionally be useful here.

The children themselves generally come forward with suggestions as to how the surface of the globe might be transferred to flat paper. Some of these invariably end in a necessity to crumple, fold, cut, or tear the paper. The children should be allowed full scope to experiment, and with a little guidance they will come to valuable conclusions. The stretching required (probably in imagination) to make the shell of an india-rubber ball lie flat is a helpful suggestion.

The elementary ideas about the existence of map projections given by this type of investigation will also account for the varying shapes of continents as shown in different maps. For example, a normally observant but unenlightened child is puzzled by the changing shape of North America when he turns from one map to another in his atlas, or from the map in his atlas to that in his text-book. In Fig. 24 are shown the outlines of North America taken from five maps on different projections, all in common use in atlases or

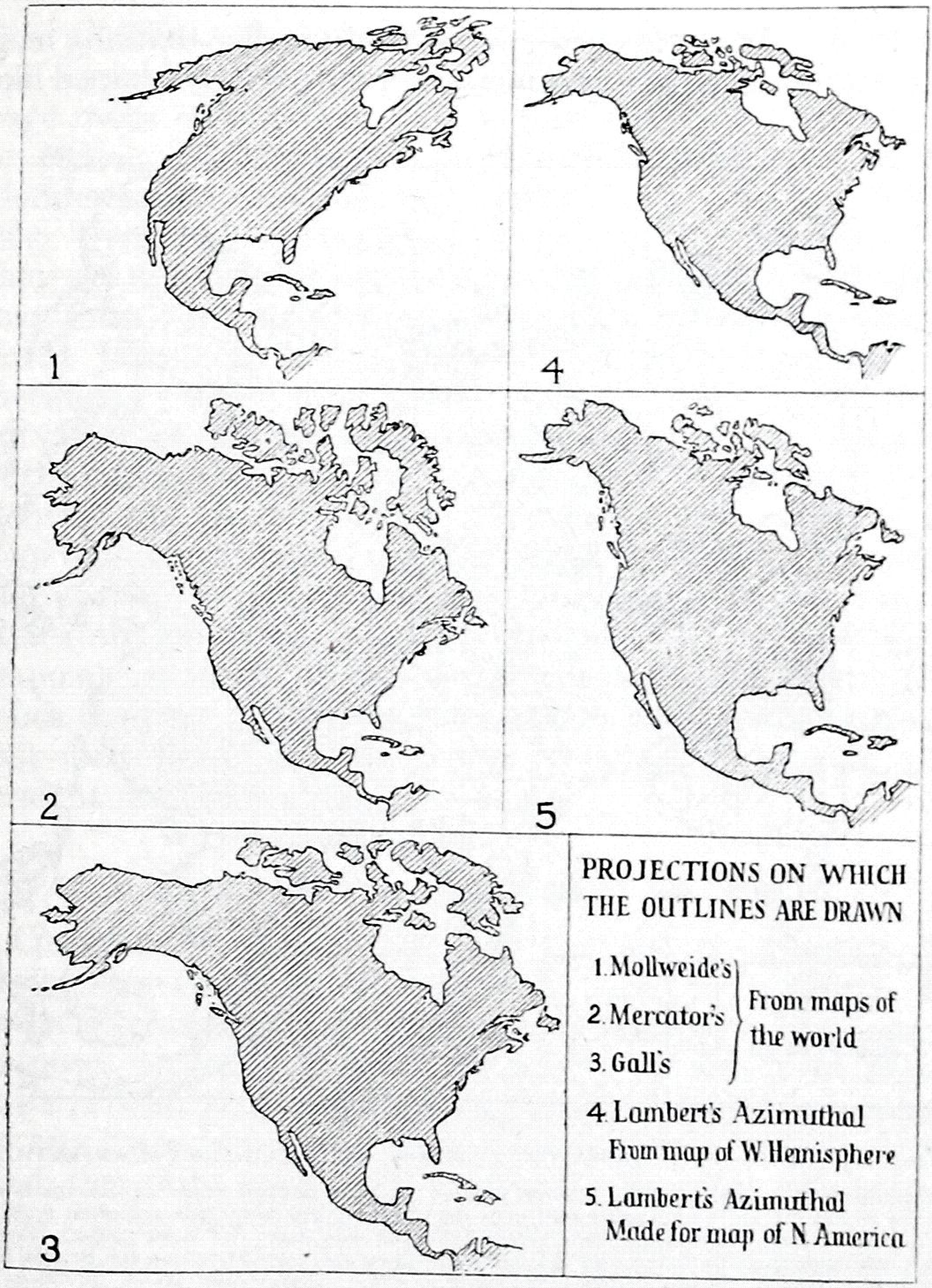


FIG. 24. OUTLINES OF NORTH AMERICA ON PROJECTIONS COMMONLY USED IN SCHOOL ATLASES AND TEXT-BOOKS

To illustrate a point that is puzzling to children who do not understand the reason for it—the apparent variation in the shape of a continent between one page and another of atlas or text-book. In several school atlases North America figures in maps drawn on four of the above projections. Only No. 5 of those shown is used for maps of North America alone. Some atlases employ yet another—Bonne's—for this purpose.

text-books. It is, of course, necessary to realize that any map of an area as large as a continent would need to be shaped like

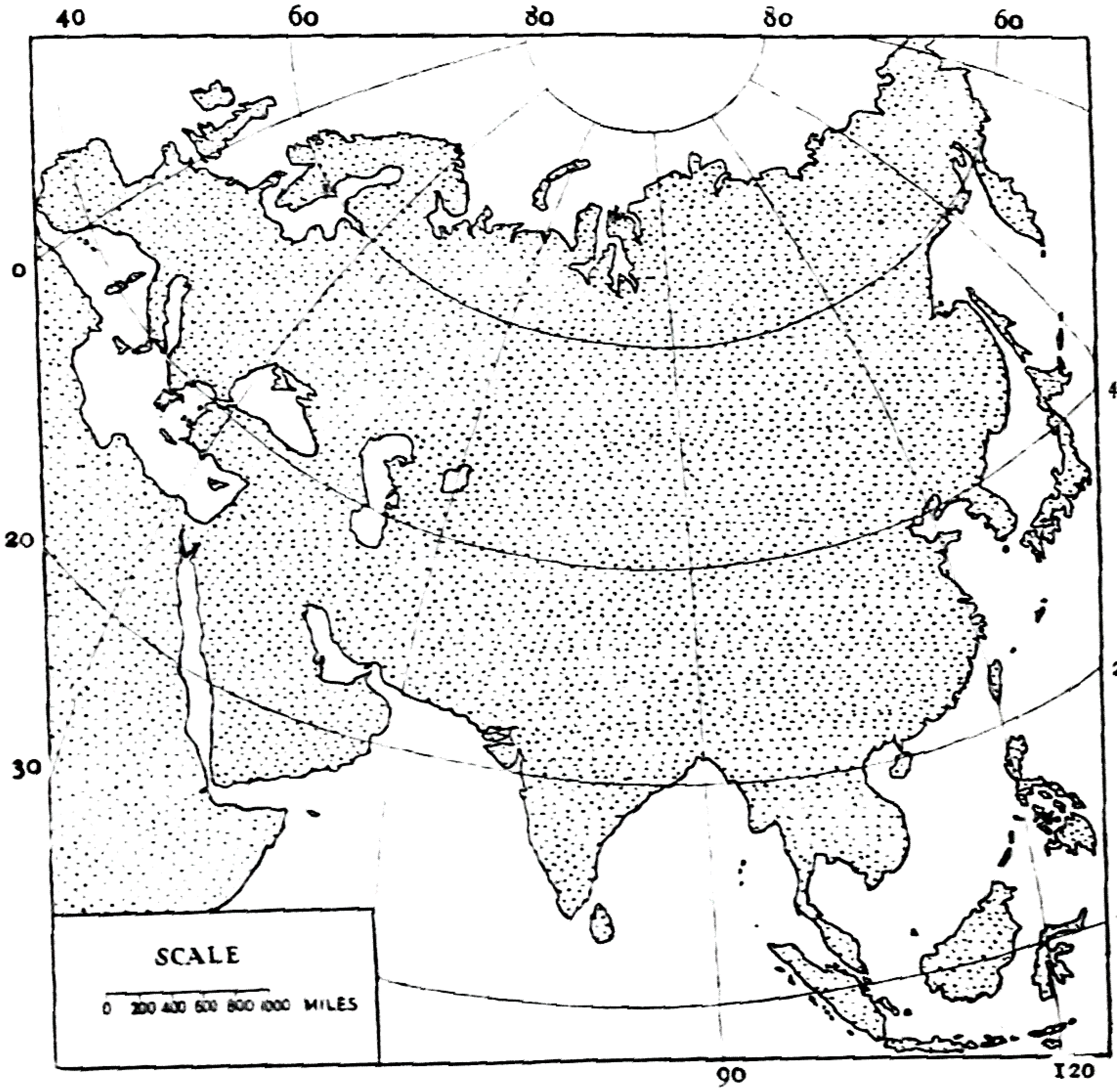


FIG. 25. MAP OF EURASIA ON LAMBERT'S EQUAL-AREA PROJECTION

This projection is used in many atlases and for wall-maps. (The whole of Europe is not always included.) In the coloured wall-map the parallels and meridians are often invisible to the class. Even when using their atlases children who have not been properly taught often take directions from the side of the page. They are puzzled to see the British Isles and other familiar regions "turned the wrong way." Their ideas about directions in unfamiliar areas may be in error by 45° or more. For example, some east-west lines meet the page margins at angles of 45° or less, and some north-south lines are drawn almost parallel to the top margin.

the surface of an upturned bowl or saucer or an open umbrella to approach a true representation.

No map of a continent should be used without attention to the lie of the parallels and meridians. Fig. 25 illustrates

this. Children who assume that 'north–south' or 'east–west' are invariably parallel to the margins of the map or the page make serious mistakes in using a map of Asia on this projection. Many children are genuinely puzzled to see the Mediterranean "turned the 'wrong' way," or the British Isles "lying sideways,' but in the case of regions with which they are not already familiar there is a danger that children may form very faulty impressions (*e.g.*, of the position and lie of Japan) by ignoring the trend of the parallels and meridians. When seen in the light of understanding the curvature of latitude and longitude lines and the 'skewing' of the lands at the margins in the higher latitudes are indications of the large extent of the earth's surface which the map represents, evidence of the great width of the continent of Eurasia. In this connexion the one great advantage of Mercator's projection must be stressed. Airmen (as well as seamen) use maps on Mercator's projection, because north–south lines are parallel to one another and at right angles to east–west lines, so that a line of constant bearing is a straight line on the map.

A Projection for the Map of the World

Considerable care should be exercised in choosing the projections for maps of the world used by children. No projection can ever be entirely satisfactory. For general purposes probably Mollweide's projection has most points in its favour, while Mercator's projection should be avoided for any maps but those which show shipping- and air-routes (and this only because it represents bearings (directions) truly; otherwise it should be avoided altogether).

The advantages in favour of the Mollweide projection[1] are:

(i) Areas are shown correctly (in proportion). Therefore one of the main functions of world maps for children's use —that of showing relative sizes of continents, etc.—is provided for. In the case of countries which lie on opposite sides of the globe easy comparison of area can be made only

[1] Shown in Fig. 17.

from a *map* of the world. A political map of the world on Mercator's projection exaggerates the area of, for example, the British Isles, Canada, etc., and minimizes the area of countries in low latitudes—*e.g.*, India. The common use of Mercator's projection may be responsible for the mistaken impression retained by many people in Britain concerning the size of India in comparison with their own country.

(ii) Latitude lines are parallel and straight throughout. Therefore east–west directions present no difficulty.

(iii) The meridians meet at the poles (which they do on the globe). The margin of the map is curved according to the trend of the meridians (unlike that of the map of Asia). Therefore the bending round of north–south lines is suggested by the margin of the map.

(iv) The oval shape of the whole map is a constant reminder of the fact that it is (*a*) a representation of the *spherical* earth and (*b*) a representation that is much strained and distorted. Maps on cylindrical projections—*i.e.*, with straight meridians and parallels and rectangular shape—are often equally strained in one way or another, but do not indicate by their form that they are distorted representations of the surface of a sphere.

On Mollweide's projection shapes are badly distorted near the margins of the map, but land areas are relatively few and small here. In any case, children should never use maps of the world so exclusively that they 'learn' the shapes of continents from them. Every child who is properly taught should recognize and understand the reason for the distorted shapes of, for example, Australia and New Zealand on Mollweide's projection (Fig. 17) or on any other. Distortion of shape is much more easily noticed than distortion of area, and because of this Mollweide's projection is probably less misleading than others which represent shapes more truly, but exaggerate areas. The globe is the only piece of apparatus which shows the shapes of continents correctly. Failing the globe, to show shape satisfactorily a map of each continent alone on the projection best suited to it must be used.

Perhaps the strongest objection to Mollweide's projection

is that it is unsuitable for any purpose in which reference to the cardinal points is frequently necessary. (This applies to *any* projection which does not show parallels and meridians crossing always at right angles.)

Recentred or 'interrupted' projections for maps of the world are now frequently used in atlases. The continents are shown satisfactorily, but oceans lose their wholeness. A child using this projection, especially if oceans are left

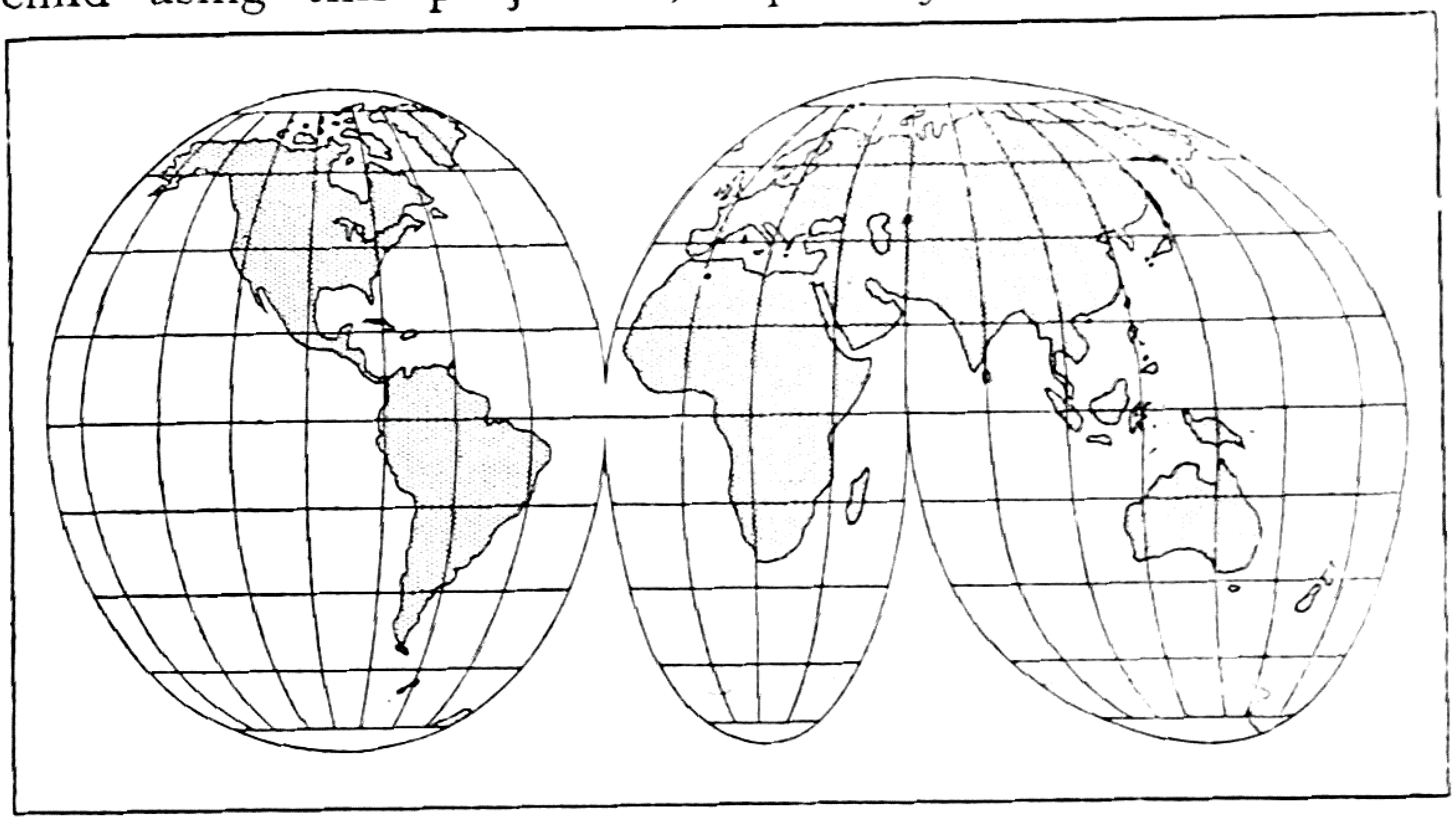


FIG. 26. MAP OF THE WORLD ON AN INTERRUPTED MOLLWEIDE'S PROJECTION

white, may gain a grossly exaggerated impression of certain oceanic distances (*e.g.*, from Newfoundland to Ireland)—far more exaggerated than that conveyed by Mercator's projection. Yet, used with understanding, a recentred equal-area projection, such as that in Fig. 26, is the most satisfactory of all for purposes that require comparison of areas between parts or wholes of continents. (See p. 125, Note.)

THE ATLAS

Characteristics, etc.

Their first atlas is a source of delight to most children, a possession that may be treasured in secret or displayed with

pride (even by some children, to the writer's knowledge, taken regularly to bed!). No doubt an atlas holds much mystery and wonder for a child. Apart from the attractiveness of its novelty, colour, etc., the child realizes in a vague way that a wealth of interesting information lies set out on its pages—for those who possess the knowledge whereby to understand. But a child of nine to ten years is not yet equipped with more than a fraction of that knowledge. His fragmentary understanding certainly does much to increase his interest in the maps, but neither this nor his delight in using the atlas must be mistaken for complete capacity to do so. By all means let him learn how to use it by using it, but the teacher must not lose sight of the fact that this is what is going on. Too often in the past children have been supplied with atlases on entering a certain form in the school, more or less as a matter of course, and have been expected to use them forthwith correctly, not always by the geography teacher.

The first atlas should be a very simple one, containing a fairly small number of maps selected to meet the needs of children of this age. Economy is not served by supplying young children with the larger and more expensive atlases suitable for the middle and upper school, because if the first atlas is used as much as it should be by children of this age a new one is likely to be required in less than three years' time. Atlases which contain too large a number of pages and maps thickly printed with names are bewildering for children, and cause considerable waste of time in finding places. Yet the atlas selected should be full enough to be of real use to the children. (Some of the cheapest atlases err on the side of over-simplification.) The maps should be clearly printed with relatively few names, but not in print so large that a city stands out in misleading isolation because neighbouring towns are omitted. For this and other reasons it seems best that the maps, and therefore the pages of the atlas, should be as large as is convenient, for print that is very small should also be avoided. It should be possible for a child to find marked in his atlas the position and names of

all physical features of great significance and all towns and cities of world importance.

Though bold and simple, the maps should be in every respect *real* maps—the maps of geographers. Relief should be shown in no other way than by layer colouring. In some children's atlases the relief maps are photographic representation of models. They make an appeal to the eye, and probably convey a clear impression to a child's mind. But this impression is bound to be a faulty one by reason of the exaggeration of slopes, heights, and the widths of rivers, and because of the over-simplification that cannot be avoided. This would not be so serious if the map did not look like a photograph of the real thing.

All maps should be artistically beautiful, and the colours used should always be the recognized conventional colours for their respective purpose. Other characteristics of a good child's atlas are mentioned incidentally throughout this chapter. No atlas yet published satisfies all the requirements that have been claimed for a first atlas by various educationists. A list of atlases suitable in some respects for children of the age in mind is given at the end of this chapter.

The Child's Equipment of Knowledge

Before proceeding it may be as well to summarize the extent of a child's capacity to use an atlas at the age of about nine and a half to ten and a half. If he has pursued a course of preparatory work on the lines indicated in Chapters III and IV a child finds many of the features in his atlas quite easy to understand. He has a working acquaintance with scale and direction, some appreciation of the projection difficulty, and a fair knowledge of the shapes and relative positions of the continents and oceans. He has some understanding, gained through experience of the relation which maps bear to the realities that they represent, of their purpose, scope, and possibilities, but he has a great deal yet to learn in these directions. Many of the ideas developed in the earliest work need to be taken up again and re-emphasized

in a new light and with a wider application; and there are several other important pieces of tool knowledge to be acquired. However, that which is needed from now onward can best be learned by *using the atlas.*

The atlas is a compendium of information, a work of reference to be used constantly, not only in class discussions, but independently by the children during periods of study. A child should therefore learn how to use the index and the table of contents. The latter enables him to find a given map quickly without too much turning of the pages. The former resembles a dictionary, which children of about ten years should be learning to use, but it has the added complication of latitude and longitude figures, which need a slightly fuller explanation at this point—*i.e.*, concerning the division of one degree into sixty parts (minutes). The fact that they are likely to be used, if only occasionally, to find places in the atlas by children working independently at this stage is a further reason for insisting on that simple acquaintance with latitude and longitude lines suggested in the previous work.

The Relation of One Map to Another

One point that needs revision in the wider connexion is the fact that a map of any region (smaller than the whole world) does not show an entity complete and detached, but merely a fragment of a greater whole. It is to be hoped that the time is passed when children left school with the impression that 'France' is a map of somewhat quadrilateral shape on page so-and-so! Such a conception was the result of bad teaching in a number of respects, but it serves here as an example of inadequate use of an atlas. Every child should be able to relate the *map* of France to the map of Europe, and thereby 'see' *France* as a part of the continent of Europe, in relation to the seas around Europe and the lands beyond them.

Even to-day for some children in school Palestine is merely a country with a peculiarly simple outline, very easy to draw.

A child who is able to use a large-scale map of Palestine should also be able to perceive Palestine in relation to the Mediterranean Sea, to Egypt, Arabia, the Sinai Peninsula, and the Red Sea, Mesopotamia, Asia Minor, etc. He should, in fact, know that Palestine lies in that important position where the continents of Europe, Africa, and Asia are linked together by land, even though the significance of that position and its additional importance as a part of the land barrier between the Mediterranean Sea and the Indian Ocean cannot as yet be realized. No small area should be studied by means of large-scale atlas-maps without being related also to its wider setting with the help of small-scale maps—*e.g.*, of a continent, or in this case of two or more continents. For children who are beginning to learn the use of an atlas, at about ten years of age, the teacher will find that a pleasant and profitable, if apparently trivial, occupation for a spare five minutes is that of discovering as many maps as possible which show the position of a given country. (For example, a map of Holland is included in maps of Europe, Germany, the British Isles in relation to Europe, the world, etc.) A considerable amount of valuable information about the position and extent of that country is gained in the process, as well as useful familiarity with the atlas and its possibilities. It may not be out of place here to suggest the warning that the map should not be spoken of as the reality. It is not 'Holland' that is found, but *a map of Holland*.

Relative Sizes and Scales of Maps

The fact that practically all maps in the atlas are made to cover pages of the same size and shape may also lead to misconceptions about areas of countries or continents. That such mistaken impressions are common among those leaving school may be shown by two examples: (*a*) Many students learn with surprise that Palestine is not much larger than Wales, and approximately one-tenth the size of Great Britain; (*b*) an intelligent student who had distinguished herself in post-Matriculation work at school declared that

she was astonished not only to learn that Kenya is more than twice as large as Great Britain, but that it should even equal Britain in size! A child is apt to forget the small size of Palestine and the large size of Africa when he uses maps of both on pages of equal area. Even between the maps of continents there is great variation of scale. One child's atlas fits the map of each continent suitably upon the page by using the following approximate scales:

Australia: 1 to 20,000,000, or 320 miles to 1 inch.
Europe: 1 to 30,000,000, or 480 miles to 1 inch.
South America: 1 to 40,000,000, or 640 miles to 1 inch.
North America, Africa: 1 to 50,000,000, or 800 miles to 1 inch.
Asia: 1 to 60,000,000, or 960 miles to 1 inch.

The same atlas shows the British Isles on the scale of 1 : 6,000,000 (96 miles to 1 inch) and England, Scotland, and Ireland each on the scale of 1 : 3,000,000 (48 miles to 1 inch). In order to make clear the difference in actual sizes, not only is the scale of each map clearly stated, but a map of Britain on the same scale is inset with each map on which Britain does not appear (*cf.* p. 72 and Fig. 28). It is important to remember that for comparisons of area, if the globe is not used, maps on equal-area projections are essential. (In later work comparisons should be made with the help of figures giving areas in square miles.)

Orientation

Another source of misconception is the *position* in which maps are placed on the pages of an atlas. Wall-maps and atlas-maps are all made with the north 'at the top.' In order to bring home the fact that this is mere convention these maps should occasionally be orientated and used in that position, so far as this is possible. Some teachers of geography would go even farther, and suggest, for example, that since France lies to the south of Britain "the real France is naturally visualized from any one place in Britain with

the north of France towards one,"[1] and that therefore the student should be quite at ease using a map of France placed so that its northern margin is nearest to him. Some geographers would assert, however, that this could not be the case unless the student happened to be sitting facing south, and therefore facing France, for otherwise the map would not be correctly orientated. The aim is, of course, to prevent the development of ungeographical—even slovenly—thinking, of which we have evidence in statements like "The Himalayas are on the top of India," or "Chicago lies at the bottom of Lake Michigan"! Less noticeably incorrect, but more insidious because frequently used by teachers (*e.g.*, when demonstrating with a wall-map), are such phrases as "Up here" or "Down there."

Maps for Different Purposes

On turning over the pages of a newly acquired atlas a child of ten may find several maps in unfamiliar colourings, and therefore at present largely shrouded in mystery for him (*e.g.*, rainfall and vegetation maps). Occasionally some of these maps may be called into use in connexion with incidental lines of inquiry—*e.g.*, about climatic conditions, ocean currents, etc. By the age of ten to eleven years children can and should understand that there are other uses for maps than to show "where places, towns, or countries are," "how low or how high the land is," etc. The child's maps are also made to show "where the climate is rainy and where it is dry at a certain time in the year," or "where most and fewest people live," etc. Proper use with full understanding of these and other maps cannot be expected for several years. The use of relief maps seems to need special consideration, and has therefore been allotted a chapter to itself.

From the age of about ten years onward atlases should be in constant use in all geographical teaching and study.

[1] Fairgrieve, *op. cit.*, p. 30.

Yet it is important for the teacher and the children to remember that, in spite of its value as an indispensable source of information and all the interest that it should continue to hold, the atlas is only a means to an end. Geography is not merely a study of maps. The geographer refers to his atlases to discover and to estimate as truly and as fully as possible some of the facts of geography.

This chapter merely gathers together some of the important items of 'tool knowledge' which children need and can gain incidentally, while following the many lines of interest which lead them to seek information about distant parts of the world during their last two years in the primary school.

Note 1. Since this chapter was written much of its content has been carried further in a book for children: Garnett, O.: *Globe and Map* ("The Discovery Books," Book III, Part II) (Blackwell, 1953).

Note 2. For fuller details concerning the use and study of atlas-maps see Chapters XI and X and the bibliography which follows.

USEFUL BOOKS FOR REFERENCE

BALCHIN, W. G. V.: *Air Transport and Geography* (Murray, 1947).

The student is also likely to find interesting several essays in WEIGERT, H. W., and STEFANSSON, V.: *Compass of the World* (Harrap, 1946).

The Geography of Post War Air Routes (Geographical Journal, March 1944).

TAYLOR, E. G. R.: *Geography of an Air Age* (Oxford University Press, 1945).

Merchant Airmen (H.M. Stationery Office, 1946).

FAIRGRIEVE, J.: *Geography in School*, especially Chapter XIV (University of London Press, 1930).

WALKER, J.: *Map Interpretation* (Johnston, 1933).

STEERS, J. A.: *An Introduction to the Study of Map Projections* (University of London Press, 1949).

KELLAWAY, G. P.: *Map Projections* (Methuen, 1946).

MAINWARING, J.: *An Introduction to the Study of Map Projections* (Macmillan, 1943).
MERRIMAN, A. D.: *An Introduction to Map Projections* (Harrap, 1947).
GOODALL, G.: *The Globe and its Uses* (Philip, 1936).
WINTERBOTHAM, BRIGADIER H. S. L.: *A Key to Maps*, Chapter IV (Blackie, 1936).
WILMORE, A.: *The Groundwork of Modern Geography*, Chapter XXI (Bell, 1953).
FAIRGRIEVE, J., and YOUNG, E.: *Human Geographies*, Book III, Appendix II (Philip, 1928).
NEWBIGIN, M. I.: *An Introduction to Physical Geography*, Chapters XI and XII (Dent, 1921).
ILLINGWORTH, A.: *An Approach to Map Reading* (Geography, June 1946).
KINGSLAND, J. C., and SEAGER, D. W.: *Navigation* (Oxford Air Training Manuals. Oxford University Press, 1943).
STRAHLER, A. N.: *Physical Geography*. Chapters I–IV (Chapman and Hall, 1951).

EXAMPLES OF ATLASES FOR CHILDREN IN JUNIOR AND PREPARATORY SCHOOLS

BARTHOLOMEW, J.: *The Comparative Atlas of Physical and Political Geography* (Meiklejohn).
—— *Intermediate Atlas* (Meiklejohn).
—— *The Oxford Preparatory Atlas* (Oxford University Press).
Harrap's 3-D Junior Atlas.
Philip's Visual Contour Atlas.
Philip's New School Atlas of Comparative Geography.
Collins–Longmans: *The Clarion Atlas.*

There are many more—*e.g.*, those published by Bacon, Johnston, Longmans, Nelson, and other firms.

For globes of various kinds the teacher should apply to George Philip and Son, Ltd, 32 Fleet Street, London, E.C.4.

Note. Since the 1949 edition of this book was published some new projections have begun to appear in atlases, notably the Nordic Projection in Bartholomew's Advanced Atlas (Meiklejohn, 1950). This projection has several points in its favour, although the fact that the South Pole appears twice on the map may be confusing for children.

CHAPTER VI

SOME TOPICS OF INTEREST TO CHILDREN BETWEEN THE AGES OF NINE AND ELEVEN YEARS

THE fact that work done by children in pursuit of their own interests includes a great deal that is *not* geographical must be taken for granted here, since the purpose of this book is to help teachers to guide the work suitably when it approaches or enters geographical 'fields.' The interests of children in the last two years at the primary school are almost without bounds, and lead in numberless ways to studies of distant lands and peoples. Exploration, discussed in Chapter IV, is but one of the more obvious topics. Some of the 'tool knowledge' required (indicated in Chapter V) is gained as the work proceeds, often without much conscious learning. Children readily see the need for it, and their increasing ability to use atlas and globe for purposes of reference becomes a source of power to them in their pursuit of many of their own topics.

The present chapter is concerned with several kinds of geographical information frequently sought by children. For convenience and clearness it is divided into three parts, each dealing with a type of interest characteristic of children between the ages of nine and eleven, and world-wide in scope.

I. PRESENT-DAY JOURNEYS ABOUT THE WORLD

Nowadays few families are without members or relations who have been overseas, during the war if not subsequently. British children live in a community that is more travel-minded than ever before. Members of any class can contribute details of journeys made by relatives, and not infrequently by the children themselves. Many more teachers have travel experiences than at any previous time. There

is every reason for making use of these experiences in school work, especially with children who, at the age of about ten, have the world to discover. When members of a class can pool accounts of journeys actually made by people known to them, the world becomes real, not 'just something out of a book,' and even books of travel take on a new meaning. Sometimes a journey made by members of the royal family to one of the Dominions gives material that children can gather for themselves from newspapers, cinema news reels, and radio. The better travel books also offer much material of the kind that children enjoy.

It is also suitable to study journeys which 'we might make if we had the opportunity.' The shipping, airways, and other companies are generally willing to give information about routes, places of call, etc., and studies of their time-tables, fares, etc., lead to valuable work, not only of a geographical kind.

The Times also publishes in the shipping columns statements about the ports reached or left by liners on the previous day, so that it is possible for children in school to keep a 'log' recording a ship's progress (*cf.* Fig. 27).

The value of such an activity lies partly in the fact that it enables the children to gain more exact conceptions of distances in terms of time, and therefore to develop truer ideas about the relative positions of places on the earth's surface. Two examples will serve to illustrate what is meant.

In a small class of boys and girls aged nine to ten, each child was allowed to choose one of several vessels leaving England within the same week for the purpose of studying the route taken and recording the progress made by the vessel. One boy promptly 'bagged' the *Berengaria*, because he knew that she was the largest. He was delighted when she was signalled from mid-Atlantic about three days later, and again when she reached her destination (New York) before any of the other vessels reached theirs. But his pleasure was short-lived, for while the *Berengaria* was ploughing her way back, and out and back again, across the Atlantic the vessels followed by the other children to India,

South Africa, China, Australia, etc., were going from one interesting place to another on the way to their final destinations. Among other things the fact was brought home to this class, as nearly as possible by experience, that North America and Britain lie within relatively easy and rapid

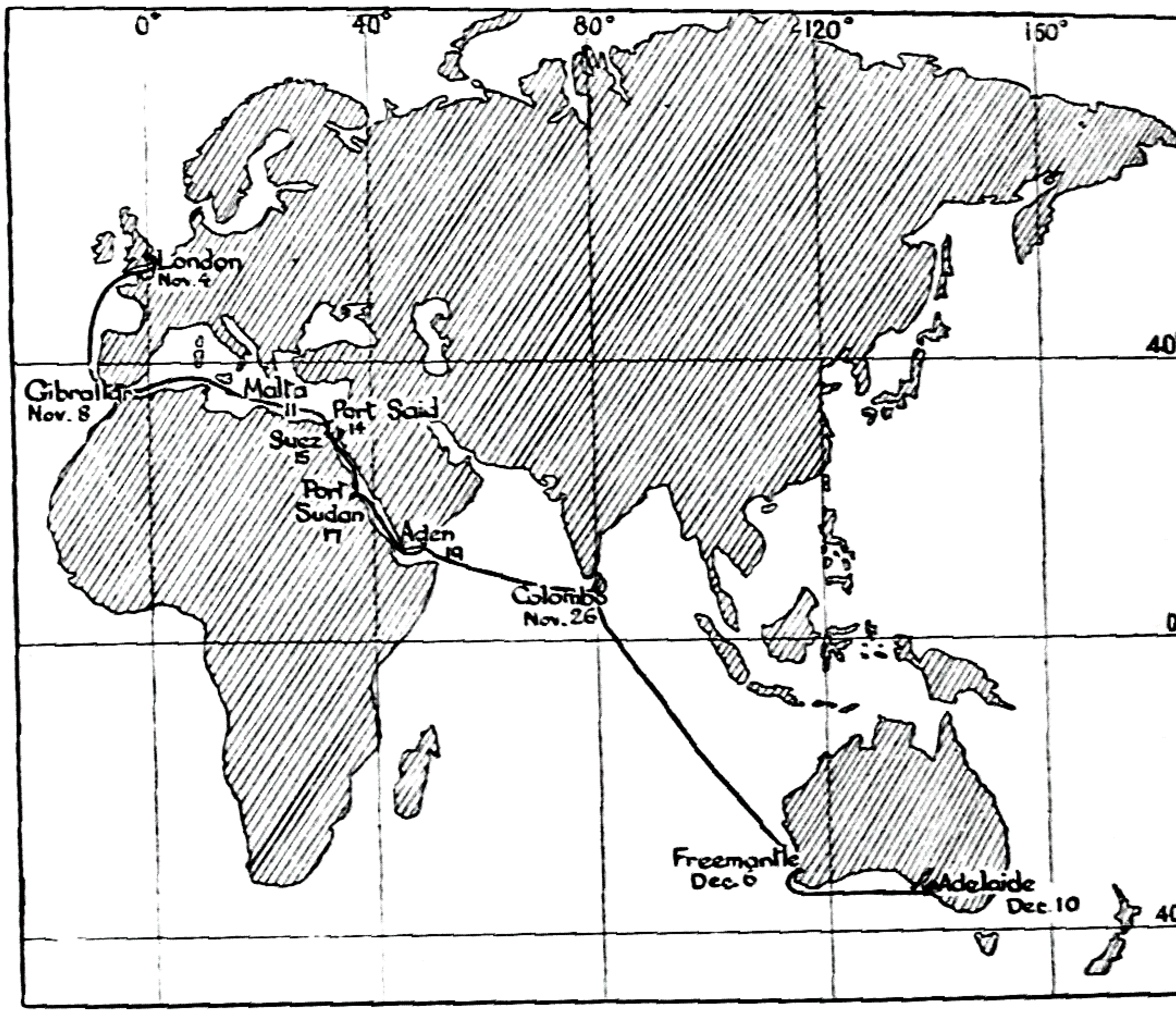


FIG. 27. MAP TO SHOW THE COURSE OF THE "MOLDAVIA" AS RECORDED BY CHILDREN IN 1927

An outline map was supplied. The children coloured the land-masses, and marked the progress of the ship as reported in *The Times* shipping columns.

communication with each other on either side of the Atlantic Ocean.

A class of girls aged about ten in a primary school were recording the voyage of the *Moldavia* to Australia. The 'log' had been kept as far as Port Sudan, in the Red Sea, but since the lesson of the previous week the children had heard nothing about the *Moldavia's* movements One child volunteered to show on the globe the position which she

imagined the ship would have reached. She placed a dot in the Arabian Sea, towards the Gulf of Aden—*i.e.*, in what was probably very nearly the correct position, for, though at the moment only the teacher was aware of it, the vessel had called at Aden two days previously. That particular child showed that she could understand and compare distances as represented on the globe, and translate them into terms of time, in this case of a liner's movements.

As the course proceeds information will be gathered by the teachers and children about life at sea, countries and places passed, their climate and weather conditions, etc. Pictures and descriptions can be collected from many sources and used as a basis for study, and perhaps also as material for a book about the journeys, made by the class.

The value of such a study of world journeys at this stage in the school-work may be summarized briefly as follows:

(i) The work gives, or revises and amplifies ideas concerning (*a*) the spherical earth and its representation by globes and maps; (*b*) the distribution of land and water (in greater detail than before); (*c*) the meaning and use of such terms as latitude and longitude, equator, poles; (*d*) distances and space relations as they must be considered to-day with modern means of communication.

(ii) The children learn the exact position of many countries, cities, etc.

(iii) The children begin to gain a working familiarity with the maps in their atlases.

(iv) They gather much incidental knowledge of geographical interest and value—*e.g.*, about different kinds of weather experienced in different places, about natural features, products, peoples and their homes and occupations, etc.

It will be noticed that a large proportion of these points —(i), (ii), and (iii)—concern the acquisition of 'tool' knowledge—*i.e.*, knowledge that will be needed for an intelligent attack on later work in geography.

The information suggested under (iv) (incidental geographical knowledge) should remain more or less unclassified.

It is part of the store of knowledge which every child must collect before conclusions can be formed. No seeking for reasons should be introduced by the teacher until the children *themselves* ask for them. No doubt there will be many questions "Why?" as the work proceeds, and these should be dealt with simply and directly. If the child is able, with the teacher's help, to seek for answers to his own questions in books, etc., by all means let him do so, but he should never be expected to 'think out' these answers if his own background of knowledge and mental capacity are inadequate for the purpose, as is generally the case at this stage. (*Cf.* Chapter II, pp. 27–30, and Chapter IX.)

II. Peoples who live close to Nature

It has long been recognized that primary school children are not only interested in peoples whose lives are simpler or more primitive than their own, but that they also feel something which might almost be called a kinship with them. The common practice of rigging up a 'tent' and spending much time therein—even by children who know little or nothing of real tent-dwellers—is but one example. Boys are often interested in hunting and tracking, girls in primitive homes and the daily life of children and their mothers. A common interest is in 'houses,' and children who have previously studied the building of an English house readily turn to studies of houses in other lands. These, if suitably chosen, afford striking contrasts, being constructed of different materials, and therefore of different shapes, in lands where the need for shelter from different conditions is caused by different climates.

To use any of these interests in school is wholly desirable. If the work is attempted with children younger than nine it should not as a rule be accompanied by any reference to map or globe. A child of eight does not feel the need for these things (which in any case he does not understand sufficiently), unless a grown-up has already introduced

them to him under the mistaken idea that he should 'learn where Africa is.' For a child of eight it is sufficient to say, 'In a country called Nigeria,' and leave it at that.

As indicated in Chapters II and XII, it is the writer's opinion that, for serious study by the children, work on topics of this kind is best taken when the children are *at least* nine years old. Among the reasons for this view are the following.

(i) With children of nine or more years of age reading has become relatively easy in all but exceptional cases. Many children not only can read the books written specially for them (see list on pp. 146-147), but can turn farther afield, and gather additional information from books of travel and even some standard works. Given facility in reading, the photographs and other illustrations with which these books abound become a rich source of information. (Where reading is still slow and halting it is greatly helped by the interest which the geography books arouse, and perhaps even by the realization in this connexion that the very things one wants to know about can be discovered in books!)

The educational advantages of these facts are important. In the first place, the children are not listening more or less passively to the teacher's accounts, but are intensely self-active. They are making the work their own, and experiencing the joy of discovery in finding things out for themselves. Secondly, they are not receiving a verbal account at second or third hand, but are working as real students of geography, going to original sources for their information. Thirdly, by the size of the books, and perhaps in some fortunate cases by their number, the child is impressed with the fact that what he knows about the Arabian Desert and the Arabs, for example, is only a tiny fraction of the amount there is to know. He has not 'done' the Arabs in a lesson or two!

(ii) A study of peoples in various parts of the world is best carried out with reference to maps and the globe, and it is assumed that children should not use these until they can do so with some understanding.

(iii) In addition to their growing interest in foreign lands,

the children are now beginning to develop mental attributes or qualities necessary for this type of study. For example:

(*a*) The possession of a background of experience in the light of which they can imagine conditions that they have not experienced.

(*b*) An ability to attempt to imagine oneself in the place or circumstances of another, when those circumstances have never actually been witnessed. A child who possesses this gift will not think of habits of life which are merely strange to him as funny or absurd. He will not express himself as did a child of seven: "Oh, yes, Eskimo—they're the people who *dress up* in fur clothes! Funny, aren't they?"

(*c*) A growing ability to compare and contrast, to piece together facts, to reason scientifically from cause to effect and from effect to cause.

(iv) It is educationally right that junior-school geography should often be connected with some form of manual activity. In the past topics from this scheme about peoples have frequently been chosen as subjects for handwork. The relation of geography to handwork will be considered more fully in Chapter XIV. If this handwork is to be educationally sound it must necessitate references to books, pictures, and other sources of detailed information. The children must express true knowledge of facts in the models they construct, and it is *not on the teacher* that they should depend for this knowledge. A further consideration lies in the necessity for skill in the manipulation of materials, often of a kind that cannot be expected before a child is at least nine years of age. It is often impossible for younger children to use the materials that are geographically right (see pp. 323–327).

(v) A study of the lives of representative human types, particularly of those who live close to nature,[1] is definitely

[1] The fact that such peoples are becoming fewer in numbers, and that some are changing their ways (after contact with European trade, education, etc.), does not reduce this value, although it calls for care on the part of the teacher—for example, in using the past tense where necessary.

valuable as part of the curriculum at about this stage, not only for its own sake as a study of cultural and educational value, but also because other studies—for example, in history, Scripture, etc., as well as in geography—demand the type of knowledge and understanding which it gives (*e.g.*, of the characteristics associated with pastoral and hunting nomadic peoples, agricultural peoples, fishing peoples, mountain peoples, etc.; of modes of life found among native inhabitants of steppes or deserts as distinct from those of forest clearings or well-watered valleys, etc.). There should be time and opportunity before the age of eleven or twelve years for a child to acquire a certain amount of intimate detailed knowledge about definite peoples of these types, so that in later life at school and elsewhere such a term as, for example, 'nomadic,' will not be merely another word for 'wandering,' but a term carrying a wealth of associations.[1]

The immense amount of subject-matter available allows an infinite variety of choice in planning the work. Yet some school schemes on 'Life in Other Lands' still consist of the chapter headings from a child's text-book. It might be pointed out that no teacher should depend only on children's books for his material, and the children should not be restricted to one copy each of *the same* book. Yet it must be admitted that the choice usually depends to some extent on the books available. Given an adequate range of these, two problems remain—those of matter and method.

The Subject-matter

A mistake frequently made in the past has been that of including too many peoples and devoting too little time to each one. It is probably not a great exaggeration to say that "in order to know anything one must know much," at least about such a subject as the habits of a strange people. For example, it does not take more than a moment or two to learn that "many Eskimo tribes eat raw blubber," as a

[1] See, for example, Ellsworth Huntington, *The Pulse of Progress* (Scribner, 1926), Chapter V, and J. L. Myres, *The Dawn of History* ("Home University Library," Williams and Norgate, 1911), Chapter II.

generalized statement, and one formerly accepted with a certain amount of disgust by some children to whom fat in any form was distasteful (in days before rationing). If we are to realize what eating raw blubber means, and see it with understanding, it is necessary to know a great deal more about *other things* concerning the Eskimo *and* the blubber. A few of these facts are:

(i) That the eating of raw blubber is often a stern necessity, as, for example, when the hunter who has risen early and breakfasted on a cup of tepid water, after hours of strenuous hunting in his *kayak* through the icy seas has killed his first seal, and is in great need of what we should call 'a snack.'

(ii) That cooking with the restricted means available will be limited in any case to foods that *must* be cooked—*e.g.*, among the Canadian Eskimo soups of caribou meat. (This introduces need for information about cooking-pots and lamps, etc.)

(iii) That blubber *is* used in some cooked foods.

(iv) That melted blubber has a strong medicinal action, and is therefore as a rule taken in very small quantities.

(v) That from its nature (heat-giving qualities, vitamins, etc.) there could be no more excellent food in the Arctic than raw blubber, particularly for growing children deprived of sunlight for long periods. The Eskimo *needs* it and enjoys it, and white men living in the Arctic have done likewise. Without it even the Eskimo could not support life at all in many of the places where they live.

This might be amplified in several directions—*e.g.*, by accounts of the privations endured by the Eskimo tribes who live away from the sea and who cannot therefore obtain seal meat and seal blubber.[1]

The teacher will find innumerable other and probably better examples to illustrate the same truth—that it is necessary to study the life of a people in detail if it is to be studied at all adequately. The course should therefore con-

[1] *Cf.* K. Rasmussen, *Across Arctic America* (Putnam, 1927), Chapter XVI.

cern only a few representative peoples about whom sufficient information can be collected by the teacher or made available for the class. This arrangement has three practical advantages:

(i) That it does not place too great a demand on the teacher, who needs to acquire an intimate knowledge of relatively few peoples.

(ii) That plenty of time is needed if work in many directions (*e.g.*, handwork, stories) is to be included. To construct models of the kind suggested on p. 323 requires probably half a term's work, and they will often necessitate investigations which involve considerable study.

(iii) For classes in or near London (or other cities which have ethnographical museums) time should be available for the study of exhibits related to the subjects on hand. Not all peoples are represented in these exhibits, but such museums as those noted below include interesting examples of native crafts and workmanship from all parts of the world (*e.g.*, tools, utensils, weapons, clothing, boats, dwellings, etc.): British Museum Ethnographical Section, London; Horniman Museum Ethnographical Section, Forest Hill, London; Pitt-Rivers Museum, Oxford.

If the number of peoples to be studied is small, then it is desirable that care should be taken to include a representative variety of (*a*) human types and (*b*) regional types.

At this point in the school course it is of value to give some rudimentary ideas about the characteristics associated with what are known as the major natural regions of the world. By the age of eleven years the children can begin to distinguish the important climatic and vegetational types which we refer to by the names steppe, savanna, tundra, desert, etc., but no attempt need be made to delimit or explain these.[1]

The aim should be to include areas which exemplify different major natural regions, and at the same time to include if possible more than one example of each funda-

[1] *Cf.* pp. 237–238.

mental mode of life. To make this clear two tables are given on pp. 137 and 138, relating the human types to regional types, and *vice versa*.

From Table II some omissions have been made—for instance, peoples who combine agriculture with pastoral occupations, such as various tribes of Sudanese Negroes. Other omissions have been made where the peoples concerned cannot be readily tabulated in this way—for example, *mountain peoples*, such as the Tibetans, Kasmiri, etc.; and *fishing peoples*, such as certain South Sea Island groups.

The peoples mentioned in these tables are, of course, merely given as examples, and the lists are only tentative and fragmentary. The bibliography at the end of this chapter gives names of books containing information about most of the peoples suggested. Many of these books are usually obtainable in good public libraries, and a fair percentage should be available in any good school library.

Many of the older books describe conditions that are no longer true in general for the peoples concerned. Yet it would be a pity to discard studies of such great interest and value simply because the descriptions should now be given in the past tense. The lives of many nomadic peoples in the U.S.S.R. have been modified by the rapid spread of education and in other ways. Yet a knowledge of their age-old mode of life, which, until within our own time, has remained as Marco Polo described it in the thirteenth century, has an educational value wider than that of its geographical interest. Truth must, of course, be served; and some of the books written for children are open to criticism from this point of view; for instance, in their implication that the characteristic winter dwelling of all Eskimos is a snow igloo. In taking work of this kind the teacher should endeavour to use topics for which he has been able to make his own knowledge accurate in detail, as well as up to date. He can then supply such significant points as the fact that it is cheaper for an Alaskan Eskimo to use the regular air route between two distant places than to spend weeks going by sledge.

TABLE I

Examples of Human Types related to Natural Regions

I. Natural Regions	II. Peoples (Representative Examples)		III. Inhabiting Parts of
Equatorial Forests	Hunters	Pygmies	Congo
	Hunters practising slight amount of primitive cultivation	Mimika Papuans	Dutch New Guinea
		Semang	Malaya
	Agricultural (with some hunting)	Fang	Congo
Savanna	Pastoral (or pastoral + agricultural)	Fulani, or any of various Sudanese tribes	N. Nigeria, Sudan, etc.
	Agricultural	Hausa	N. Nigeria
	Pastoral + agricultural	Kafirs	Natal, and elsewhere in S. E. Africa
Semi-desert or Scrub	Hunters	Bushmen	Kalahari
		Arunta, or other Australian tribes	Australian 'bush' and semi-desert country
Desert	Pastoral nomads	Bedouin Arabs	Arabia, etc.
		Tuareg	W. Sahara
	Agricultural	Fellahin	Egypt: Nile Valley
		Oasis-dwellers	Sahara (oases—*e.g.*, Kharga, Tafilet, etc.)
Steppe	Pastoral nomads	Kirghiz	Asiatic steppe
	Agricultural + hunters	Sioux (Hidatsa), Blackfeet, and other tribes	Formerly in N. American prairies
Northern Forests and Tundra	Pastoral nomads	Lapps	N. Finland, N. Norway, and N. Sweden
		Ostiaks	N. Siberia
		Koraks	Kamchatka
Arctic	Hunting and fishing	Eskimo tribes	Coasts of N. Canada and Greenland

TABLE II

PEOPLES INHABITING VARIOUS REGIONS CLASSIFIED ACCORDING TO THEIR MODES OF LIFE

I. MODE OF GAINING A LIVELIHOOD		II. PEOPLES (REPRESENTATIVE EXAMPLES)	III. REGIONS
HUNTING AND COLLECTING (entirely or mainly)		Eskimo tribes of Greenland and Canada	ARCTIC COASTS
		Australian aborigines Kalahari Bushmen	SEMI-DESERT, SCRUB, ETC.
		Semang of Malaya Pygmies of Congo forests Mimika Papuans, Dutch New Guinea	EQUATORIAL FORESTS
PASTORAL NOMADIC		Lapps, N. Scandinavia and N. Finland Ostiaks, N. Siberia Koraks, Kamchatka	TUNDRA AND N. FORESTS
		Kirghiz, Central and S. E. Asia	STEPPE
		Tuareg, W. Sahara Bedouin Arabs, Arabia, and E. Sahara	DESERT
AGRICULTURAL	VERY PRIMITIVE	Fang of Congo forests	EQUATORIAL FOREST
		Bura of N.E. Nigeria	SAVANNA
	MORE ADVANCED	Fellahin of Egypt	DESERT: 'OASIS'
		Peasants of S. Italy, etc.	MEDITERRANEAN
		Peasants of Japan, etc.	MONSOON

The Method of Attack

The second problem for the teacher is *how* to guide the children in their attack on the work. Some aspects of the problem are considered elsewhere, and therefore only those which apply more particularly to this type of study will be dealt with here.

The children should be aware that the study is a very fragmentary one, that extensive areas are omitted, and innumerable peoples are not mentioned, even though they may live in parts of the areas referred to. Maps will be made to show the positions of places described and of localities inhabited by the peoples studied, and the children must learn to be satisfied with a map that has many blank spaces, or is almost entirely blank. For example, a map to show regions inhabited by the Pygmies of the Congo forest will not mark more than a very few scattered patches within the forest region (see Fig. 28).

If the emphasis is thrown in this way on the regional types, as in Table I, it will be left for the children to formulate for themselves the comparisons or classifications indicated in Table II. This can take place only after a number of peoples have been studied, and it will come at first only in a fragmentary way. The teacher should be in no hurry to point out similarities or contrasts in mode of life until the children begin to do so. When once the idea of making comparisons has taken root it sometimes grows apace, and the teacher may feel the need to exercise a restraining influence in order to keep a sufficiency of 'scientific caution.' On the whole, however, the danger lies the other way, in that it is too often the teacher who points out the comparison before sufficient facts are in the children's possession.

When the class has made a study of, for example, the Eskimo or Pygmy peoples the children should see for themselves that in spite of the contrast in the type of region inhabited there are several characteristics which these peoples have in common with the Kalahari Bushmen. For example, all three are hunters, and therefore wanderers, and

the resulting lack of permanence in the dwelling-place has a similar influence on number of possessions and limitation of home life.

When he has learned about several peoples whose mode of life is similar—say, Bedouin Arabs, Khirghiz, and Lapps—

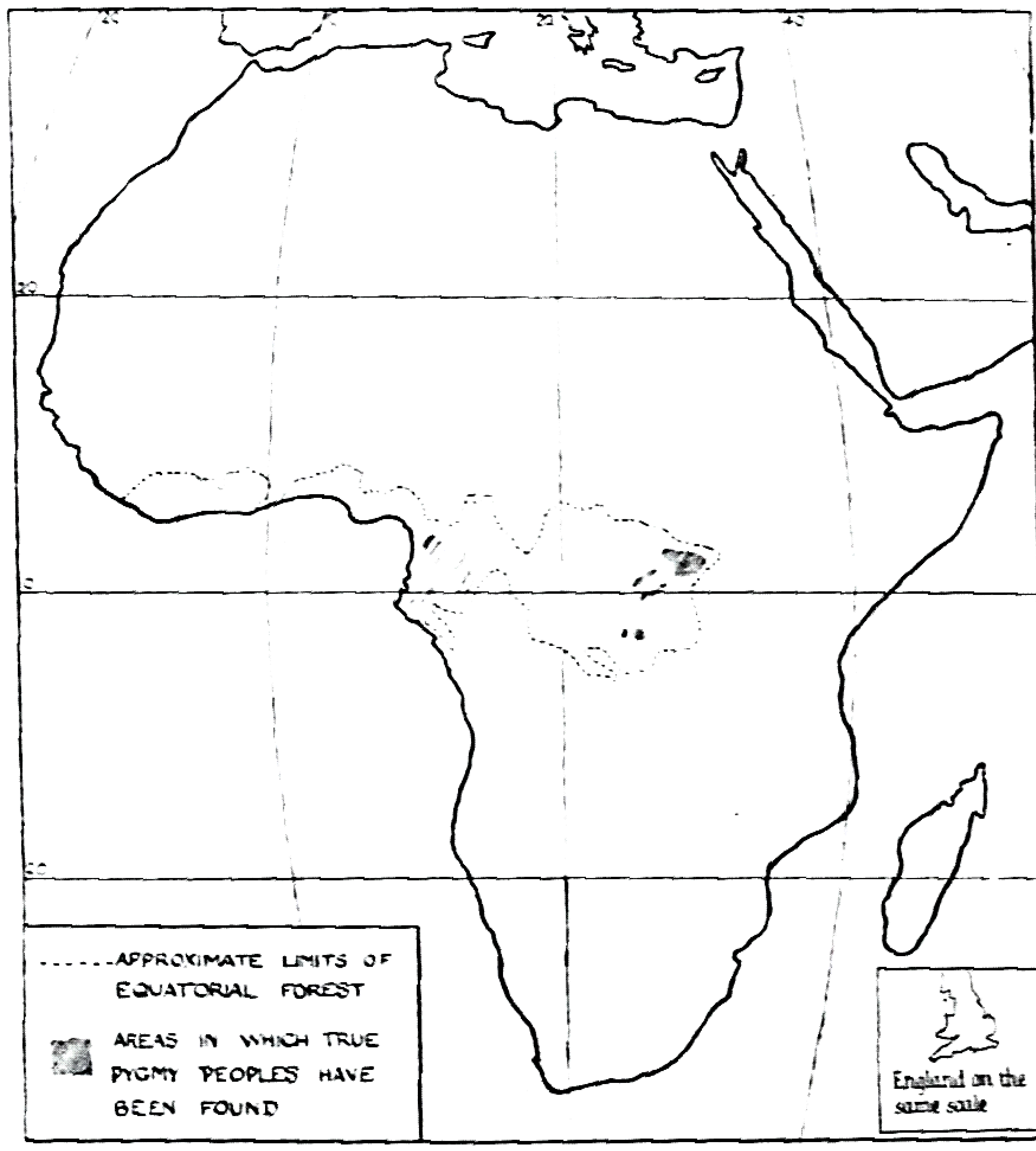


FIG. 28. MAP TO SHOW THE AREAS WITHIN THE EQUATORIAL FORESTS OF AFRICA WHERE TRUE PYGMY PEOPLES HAVE BEEN FOUND

Based upon a map in "Among Congo Pygmies," by Paul Schebesta, with the permission of the publishers (Messrs Hutchinson and Co., Ltd.)

a child will be able to make certain statements about the characteristics that seem to be common to people who follow that mode of life (in this case pastoral nomads)—*so far as he knows them.* In the light of his own knowledge of three such peoples his statements will be more guarded than if he knew only about one—even more guarded than some text-

book statements. For example, his knowledge of the Lapps would prevent him from saying that "Pastoral nomads are robbers" or "approve of stealing." He would know that *some* pastoral nomads approve of *certain forms* of robbery, but that others are astonishingly honest, even according to our standards.

The children should also come to see how in both types of nomadic peoples, hunters and herdsmen, the direct dependence on the natural resources offered by the environment (usually a harsh one) is the cause of many of their characteristics (*e.g.*, the small size of the tribal group, tendency to avoid one's neighbours, etc.). In all these respects there will be opportunities for drawing contrasts with sedentary agricultural peoples. The comparisons will not, of course, be expressed as above, but in the children's own words as and when they see these facts for themselves.

Throughout the work the teacher must keep in mind the principle that conclusions can be drawn only when one is in possession of adequate data. Reasoning must always take place from the child's point of view, and that means what is frequently for the mature geographer or scientist a 'backwards' way. For example, a child learns that the woman of a tribe of Bedouin Arabs uses a goatskin to hold milk, and he may ask "Why?" The answer is that of all articles which will hold liquids goatskins are the most readily available, and that, in addition to its breakable character, pottery, which *might* be obtained from oasis people, is (like vessels of wood, iron, etc.) more awkward to pack and carry than goatskins. For the time being the reasoning may end here, or it may be pursued further, for to understand completely one must know how it comes that goatskins are readily available, why the Arab household is a nomadic one, etc., so that ultimately one arrives at the root cause, in the 'nature of environment,' by a backward seeking for reasons why (*i.e.*, causes), rather than a forward process of looking from cause to effect.

Some writers of geographical books, who, unlike the children, have many of the facts in their possession, begin with

causes and lead up to effects. They describe the climate (or even the causes of climate), and lead up to an account of desert conditions, the desert surface, and desert vegetation. Then they proceed to explain that no cultivation is possible, but only thin pasturage available after rain; therefore the people can live only by keeping herds; therefore they have to move when the herds have consumed the pasture in order to find fresh pasture; and therefore they have to live in collapsible portable tents; and so on.

When he has reasoned things out in his own way it is easy and fascinating for a child to build up the geographer's reasoning in the reverse sequence. A normal process by which the study of a desert region and its inhabitants might develop is as follows: The child will begin by learning about the 'look' of the desert, the conditions of climate and surface, the 'feel' of the desert, etc. He will then find out all he can about the ways and habits and characteristics of the people, read stories about them, accounts by travellers and others who have lived with them, etc. The wonderful adjustments to their surroundings exemplified both in the major characteristics and in the intimate details of their life will become clear to a child only when he has collected a store of information, can sort the facts out for himself, and can consider them in relation to one another. A child of ten to eleven years of age is still at the stage when collecting facts is more prominent than reasoning about them, and many of the interesting comparisons and conclusions which fascinate the adult mind must remain for the time being beyond his ken.

Enthusiastic and advanced students of geography may perhaps be forgiven for suggesting to the children ideas that are better postponed, but no forgiveness is forthcoming for the crime committed by some teachers (usually the more unenlightened, and whose limited knowledge is only of text-book facts) who, after giving some impressions of the desert and its characteristics, but nothing more, proceed to say, "Well, what *do you think* the people do there?" or words to that effect!

A great deal of unfortunate 'jumping to conclusions' in

later school-work (and in after-school life) may probably be traced to teaching along lines exemplified in the above question. To ask a child to reason about facts he half knows and at too young an age is bad, but to suggest to him that he is expected to create facts he does not know out of his head is infinitely worse. This crime is seldom committed by a teacher who possesses a wide knowledge of geography, or perhaps one should say the right geographical outlook, for that implies scientific caution, among other things. It is probably true to say that some of the qualities that make a good geographer are also those that make a good teacher.

III. Where things come from

The type of study outlined above deals largely with the lives of people who draw their living more or less completely from their immediate environment, in some cases from within a few square miles. The modes of life of some of these peoples may even be comparable to those of prehistoric and early historic peoples in Britain and elsewhere. Although the value of such a study for a child aged about ten to eleven cannot be denied, it must also be admitted that the conditions of the child's own life in the twentieth century offer a field for study that is equal in interest geographically and in value educationally.

When he has lost some of his early curiosity in the everyday things of his environment the modern suburban child often tends to take for granted the existence and character of his food and clothing, the house in which he lives, the streets, shops, and ready means of transport of his neighbourhood, the electric light and gas, tap-water and wireless, and innumerable other things that were unknown a few centuries ago—in some cases a single generation ago. As a complementary study to that of the life of peoples who live close to nature British children might learn something of the geographical background to their own lives. One of the ways in which this can be achieved is by investigating the origin, production, and supply of the essential materials

needed for some familiar subject, such as a house, the breakfast table, an omnibus, clothes, a grocer's shop, etc. (See also pp. 205–209 and 291–292.)

An omnibus represents an assemblage of materials gathered from many parts of the world—viz., more than one kind of timber, iron, steel, and other metals, petrol, glass, rubber, upholstery materials, paint, paper, varnish, etc. These products may be traced first to factories or works in Britain and elsewhere, and ultimately to raw materials from a wide variety of countries and regions. The child's own clothing—cotton, wool, silk, artificial silk, leather, rubber, etc.—possibly includes products from every continent, and embodies the labour of people of many races—workers on plantations, ranches, farms, in forests and backwoods, as well as in factories of great variety. Moreover, the assembling of the raw materials at the factories and the delivery of the finished product at the shop or at the child's home reflect the achievements of modern transport in overcoming geographical obstacles, of which geographical distance is only one.

Studies of this kind enable a child to realize his dependence on an environment that is no less than the whole world. He begins to perceive himself, in some sense at least, as "a citizen *of the world*." Through a study that is well within his grasp he is acquiring knowledge that should help him later to appreciate the economic unity of the modern world.

There are other reasons why work of this kind is suitable to succeed that in human geography outlined previously. The economic geography may include some study of the life and occupations of Europeans, and others who have the same standards and ideals as ourselves, in places with widely different conditions and probably representative of the same natural regions exemplified in the previous course in human geography. The children may learn something about the life of their own countrymen in strange lands—*e.g.*, in Malaya, Nigeria, etc., and about Canadian lumbermen, American cotton-planters, Australian sheep-farmers, etc. They also learn a little about the changes which Europeans

are bringing to the lives of native peoples, and how some of these peoples are now engaged in work concerned with products for our own use in this country—*e.g.*, in rubber-planting and -tapping in Malay, *cacao* cultivation in the Gold Coast, cotton-growing in Egypt and Uganda, etc.

Of course, a great deal about all these matters will be learned in later school-work, when a fuller study of world geography, possibly continent by continent, will be made. The fact that more advanced and probably somewhat analytic studies will be made between the ages of twelve and sixteen, is a reason why the work in geography near the close of the preparatory- or junior-school period should supply a wide and general 'world' background as a setting in which the later work will be placed, so that the subjects of the later work may be regarded in a truer perspective. For this reason the geographical work for children aged about ten to twelve should be conceived on generous lines, and should be, in some respects at least, world-wide in scope.

These requirements are fulfilled by a study of some familiar subjects from the child's immediate environment, leading to what might be called "First Ventures in Economic Geography." From what has been suggested above it should be clear that a study of this kind would include a survey of certain areas representative of the major natural regions—from a new point of view.

Some teachers, using the older 'subject' methods would still make one scheme (human and economic), in which, for example, the work of the Canadian lumberjacks and prairie farmers is considered along with the life of the Red Indian tribes. More than one child's text-book is planned to include such a variety, even though the actual number of types discussed within its pages is small. Geography is certainly many-sided, but for that reason alone it is probably best to begin sorting things out as early as possible, and one way of doing this is for the children to create in each term's work a central theme or keynote which will give the work a unity, relating together most, if not all, of the topics dis-

cussed. This relating of topics should not be strained, but though elasticity and latitude are allowed the general coherence should be apparent to the children.

The knowledge that a child of ten to eleven is collecting is admittedly fragmentary, but it may be suggested that where possible the scraps of information, or the seeds of ideas, he gains in school should be planted in an orderly fashion, so that there is every chance that each may grow to the best advantage. Broadcast sowing of many different kinds at once is not the best way of achieving this. Therefore it is suggested that the two topics under discussion at the moment should be distinguished from one another and followed separately, though facts learned in the first will frequently be called to mind as the second is developed.

BOOK-LIST

Examples of Books for Children's Reading or Reference

Brooks, L., and Finch, R.: *Columbus Regional Geographies* (especially Book III (Junior Series): "Round the World") (University of London Press, 1945).

Fairgrieve, J., and Young, E.: *Real Geography*, Books I, II, III, etc. (Philip, 1939 *et seq.*).

Fawcett, R.: "Where does it come from?": *Bread*; *Wood*: *Coal*; *Oil*; *Cotton*; *Tin*: *Fish*: *Salt*: *Soap*: *Glass*: *Leather* (Gawthorne).

Finch, R., and Cons, G.: *The Golden Hind Geographies. Books I–IV* (University of London Press, 1937, *et seq.*).

Forsaith, D. M.: *Other Children's Homes* (Black, 1935).

—— *Many People in Many Lands* (University of London Press, 1951).

Moss, F. G.: *People and Homes in Many Lands* (Harrap, 1950).

Polkinghorne, R. K. and M. I. R.: *What the World eats* (Evans) and *What the World wears* (Harrap, 1949).

Rayner, P. R.: *The Kingsway Social Geographies, Books I–V* (Evans).

Sanders, E. M.: *The World and the British Empire* (Philip, 1933).

—— *Farm, Fish, and Forest: Geography through Products* (Wheaton, 1937).

Young, E.: *At Work in Many Lands* ("Kingsway Geography Readers"; Evans, 1933).

VARIOUS AUTHORS: *My Foreign Correspondent* (Letters published fortnightly, Meiklejohn).
Various books in the "Puffin" series (Penguin Books).

BOOKS USEFUL FOR TOPIC I

BROOKS, L., and DUCÉ, R. H. (ed. by): *Seafarers, Ships, and Cargoes* (University of London Press, 1951).
DUFF, P.: *British Ships and Shipping* (Harrap, 1949).
HARNACK, E. P.: *All about Ships and Shipping* (Faber 1949).
HOWE, L.: *The Merchant Service To-day* (Oxford University Press, 1941).
MEARLES, V. E.: *Highways of the Air* (Day and Mason, 1947).

The British Overseas Airways Corporation publishes a useful list of books and other material.

Innumerable books of travel are useful in this connexion

BOOKS USEFUL FOR TOPIC II

(*A*) General Works

BLACHE, P. VIDAL DE LA (ed. E. DE MARTONNE): *Principles of Human Geography* (translation; Constable, 1926).
BRUNHES, J.: *Human Geography* (translation; Harrap, 1920; new edition, abridged, 1952).
FORDE, C. D.: *Habitat, Economy, and Society* (Methuen, 1934).
Handbook to the Ethnographical Collections of the British Museum.
HUNTINGTON, E.: *The Human Habitat* (Chapman and Hall, 1928).
JAMES, P. E.: *A Geography of Man* (Ginn, 1949).
PAGE, J. W.: *Primitive Races of To-day* (Harrap, 1938).
—— *From Hunter to Husbandman* (Harrap, 1939).
PEAKE, H.: *Early Steps in Human Progress* (Sampson Low, 1933).
UNSTEAD, J. F.: *A World Survey from the Human Aspect* (University of London Press, 1948).

(*B*) Books about Peoples depending entirely (or largely) on Hunting

SOLLAS, W. J.: *Ancient Hunters* (Macmillan, 1924).

Greenland Eskimo

ANDRUP, G. C., VAHL, M., BOBÉ, L., and JENSEN, S. AD. (ed.): *The Past and Present Population of Greenland*, vol. ii (published by the Commission for the Direction of Geological and Geographical Investigations in Greenland).

EKBLAW, W. E.: *Material Response of the Polar Eskimo to their Far Arctic Environment* (Annals of the Association of American Geographers, December 1927 and March 1928).
KRABBE, TH. N.: *Greenland, its Nature, Inhabitants, and History* (translated by Annie I. Fausbøll; Oxford University Press, 1930).
NANSEN, F.: *Eskimo Life* (Dent, 1893).
RASMUSSEN, K.: *Greenland by the Polar Sea* (Heinemann, 1921).

Canadian Eskimo

BILBY, J. W.: *Among Unknown Eskimo* (Seeley, Service, 1923).
—— *Nanook of the North* (Arrowsmith, 1925).
JENNESS, D.: *The People of the Twilight* (The Macmillan Co., 1928).
RASMUSSEN, K.: *Across Arctic America* (Putnam, 1927).
STEFANSSON, V.: *My Life with the Eskimos* (Harrap, 1924), etc.

Eskimo: General Account

BROWN, R. N. RUDMOSE: *The Polar Regions*, Chapter XV (Methuen, 1927).
BIRKET-SMITH, K.: *The Eskimos* (Methuen, 1936).

Red Indian Peoples

(*a*) **Forest**

HEMMING, A.: *The Drama of the Forests* (Hodder and Stoughton, 1921).

(*b*) **Prairie**

CHIEF BUFFALO CHILD LONG LANCE: *Long Lance: the Autobiography of a Blackfoot Indian Chief* (Faber, 1928).
MCCLINTOCK, W.: *The Old North Trail* (Macmillan, 1910).

(*c*) **General**

JENNESS, D.: *The Indians of Canada* (National Museum of Canada, 1932).
WISSLER, C.: *The American Indian* (Oxford University Press, 1922).
VERRILL, A. HYATT: *Our Indians: the Story of the Indians of the United States* (Putnam, 1935).

Australian Aborigines

DAHL, KNUT: *In Savage Australia* (P. Allen, 1926).
SPENCER, SIR B.: *Wanderings in Wild Australia* (two vols.: Macmillan, 1929).

Kalahari Bushmen

BLEEK, D. F.: *The Naron: A Bushman Tribe of the Central Kalahari* (Cambridge University Press, 1927).

DORNAN, S. S.: *Pygmies and Bushmen of the Kalahari* (Seeley, Service, 1925).
DUNN, E.: *The Bushman* (Griffin, 1931).
SCHWARZ, E. H. L.: *The Kalahari and its Native Races* (Witherby, 1928).

Malay and East Indies

SCHEBESTA, P.: *Among the Forest Dwarfs of Malaya* (translation; Hutchinson, 1929).
WOLLASTON, A. F. R.: *Pygmies and Papuans* (Murray, 1912).

Congo Forests

CHRISTY, C.: *Big Game and Pygmies* (Macmillan, 1924).
SCHEBESTA, P.: *Among Congo Pygmies* (translation; Hutchinson, 1933).

(*C*) Books about Pastoral Nomadic Peoples

Tundra and Northern Forests

(*a*) **Lapps**

BUTLER, F. H.: *Through Lapland with Skis and Reindeer* (Fisher Unwin, 1917).
NORDSTRÖM, E. B.: *Tent Folk of the Far North* (Jenkins, 1930).
TURI, JOHAN: *Turi's Book of Lappland* (Cape, 1921).

(*b*) **Koraks**

KENNAN, G.: *Tent Life in Siberia* (Putnam, 1910).

(*c*) **Ostiaks**

BREHM, A. E.: *From North Pole to Equator* (Blackie, 1890).

Steppes, etc.

Kirghiz

BREHM, A. E.: *From North Pole to Equator* (Blackie, 1890).
MORDEN, W. J.: *Across Asia's Snows and Deserts* (Putnam, 1930).

Desert

(*a*) **Tuareg**

BUCHANAN, A.: *Sahara* (Murray, 1926).
KING, W. J. H.: *A Search for the Masked Tawareks* (Murray, 1903).
RODD, F. RENNELL: *People of the Veil: the Wandering Tuareg Tribes of the Central Sahara* (Macmillan, 1926).

(*b*) **Arabs**

DOUGHTY, C. M.: *Arabia Deserta* (new ed. in two vols.; Cape, 1926).

THOMAS, B.: *Arabia Felix* (Cape, 1933).

(*D*) Books about Peoples who depend largely on Agriculture

(i) *Very Primitive*

(*a*) Equatorial

BRUNHES, J.: *Human Geography*, pp. 351–368 (an account of "The Fang"; Harrap, 1920).
LANDTMAN, G.: *The Kiwai Papuans of British New Guinea* (Macmillan, 1927).
MAIR, L. P.: *An African People in the Twentieth Century* (Routledge, 1934).

(*b*) Savanna

HELSER, A. D.: *African Stories* (including a native's account of cultivation by the Bura in North Nigeria) (Revell, New York, 1930).
RICHARDS, T. A.: *Land, Labour, and Diet in Northern Rhodesia* (Oxford University Press, 1939).

(ii) *More Advanced*

NEWBIGIN, M. I.: *Tillers of the Ground* (Macmillan, 1920).
FAULKNER, O. T., and MACKIE, J. R.: *West African Agriculture* (Cambridge University Press, 1933).
IRVINE, F. R.: *A Text-book of West African Agriculture: Soils and Crops* (Oxford University Press, 1934).

Oases Types

BRUNHES, J.: *Human Geography*, Chapter VI (Harrap, 1920).

A number of books of travel give accounts of oases—*e.g.*, H. St J. B. Philby's *Arabia of the Wahabis* (Constable, 1928).

Egyptian

BALLS, W. L.: *Egypt of the Egyptians* (Pitman, 1920).
BLACKMAN, WINIFRED S.: *The Fellahin of Upper Egypt* (Harrap, 1927).
BUDGE, SIR A. W.: *The Dwellers on the Nile* (Religious Tract Society, 1926).

Chinese and Japanese

KING, F. H.: *Farmers of Forty Centuries* (Cape, 1926).
CRESSEY, GEORGE B.: *China's Geographic Foundations* (McGraw Hill, 1934).
FEI T'UNG, HSIAO: *Peasant Life in China* (Routledge, 1939).
EMBREE, J. F.: *A Japanese Village, Suye Maru* (Kegan Paul, 1946).

English, Colonial, American, etc.

See book-lists on pp. 75, 295, and under Topic III below.

Various Government publications and booklets issued by the Colonial Offices describe the cultivation of particular crops and other forms of agriculture under modern conditions.

Books Useful for Topic III

ALNWICK, H.: *A Geography of Commodities* (Harrap, 1934).

BROWN, R. N. RUDMOSE: *The Principles of Economic Geography* (Pitman, 1946).

PACKMAN, J. A.: *Food from the Commonwealth and Empire* (Gawthorn, 1951).

CHISHOLM, G. G.: *Handbook of Commercial Geography* (fourteenth edition). Entirely rewritten by L. D. Stamp and S. C. Gilmour (Longmans, 1954).

DICKEN, S. N.: *A Regional Economic Geography* (Heath, 1949).

HALL, SIR DANIEL: *Our Daily Bread: a Geography of Production* (Murray, 1938).

WHYTE, R. O.: *Farming for Industry* (Todd, 1948).

SMITH, J. RUSSELL, and PHILLIPS, M. OGDEN: *Industrial and Commercial Geography* (Constable, 1946).

STAMP, L. D.: *An Introduction to Commercial Geography* (Longmans, 1940).

WILMORE, A.: *Industrial Britain* (second edition)(Harrap, 1939).

SMITH, W.: *An Economic Geography of Great Britain* (Methuen, 1940).

"The Commodity Series": *The Story of Rayon*; *The Story of Steel*; *The Story of Cotton*; *The Story of Oil*; and others in the same series (Burke, 1952 *et seq.*).

See also various Government publications, including those of the British Dominions, to be obtained at the Imperial Institute and from the London offices of the Dominions and Colonies.

For children's books see pages 146–147, and 295.

For sources of films, filmstrips, and other material for illustration, etc., see the lists on pages 190–191. Samples of commodities are obtainable from the Imperial Institute and from some industrial firms.

Much fuller book lists on these and other topics will be found in the *Handbook for Geography Teachers*, edited by G. J. Cons, published in 1955 by Methuen, for the University of London Institute of Education.

Images and Impressions

In studying geography one is faced with a difficulty that does not exist in the same form or to the same degree in most of the other school subjects (though it is found to an even greater extent in history). The subject requires us to consider situations, conditions, and happenings that lie outside our experience. How can children who have never left Britain come to possess real knowledge of, for example, an Indian village, the Panama Canal, a volcanic eruption, New York, a sugar plantation, floods in China, etc., etc.? We discuss these and thousands of other things in geography, treating them somewhat as a matter of course. Often it may be doubted whether the teacher has a series of clear, detailed visual images of them, or whether these images, if they exist, are true to the reality. Yet, granted that the teacher possesses accurate and vivid conceptions, perhaps gained from personal experience, is it possible to be sure that these are passed on to the pupils, so that the images created in their minds are equally true?

Probably the greater number of topics discussed in geography lessons concern places or subjects of which neither teacher nor children have knowledge from direct experience. The teacher has generally learned about them at second or even third hand, usually from books. In the process of passing from one mind to another, whether by spoken or by printed word, impressions are likely to become more and more fragmentary, and often faulty or exaggerated. It is therefore scarcely surprising that the conceptions of foreign places created in school geography lessons so often prove to be incorrect. The following is one of many examples:

The statement often made that Mesopotamia is a vast desert through which run two great rivers bare but for the palm-trees on their banks and flat as a pancake is true as far as it goes. It is possible to picture a land entirely different from Mesopotamia, and still stick to this description. I have met countless men who told me they had built up in their minds the wrong conception of the country and a wrong idea of its character simply by letting their imagination get to work on insufficient data.[1]

In order to obtain some information concerning the kinds of impressions of geographical subjects that exist in the minds of those who have just left school the writer has for several years in succession carried out a simple test with students entering college (from schools in all parts of Britain, and in some cases from abroad). The test consists in asking the students to write down quite frankly the nature of the image or impression called up in their minds when each of a series of geographical names is spoken. The names have always been those of places commonly discussed in school-work, and have included localities (*a*) likely to be well known (*e.g.*, from direct experience); (*b*) less well known (*e.g.*, from reading or hearsay); (*c*) probably only slightly known (*e.g.*, by seeing the name in an atlas-map).

In a typical list the names might be as follows: Winnipeg, Canton, Paris, Cairo, Jerusalem, London, Timbuktu, Cape-town, Edinburgh, Rome. For the sake of precision the names are almost entirely those of important cities or towns, not of countries or regions or other features.

The nature and methods of these tests are such that the formation of any definite conclusions would not be justified. Yet they reveal certain tendencies or characteristics sufficiently common to be worth mentioning. It has proved possible to classify most of the visual images recorded by the students into broad types, of which the following stand out:

(i) The name 'seen' in print, and nothing more (*e.g.*, MOSCOW, TIMBUKTU).

(ii) A map of the continent or of part of the continent,

[1] Donald Maxwell, *A Dweller in Mesopotamia* (Lane, 1921).

with the place marked by a dot and its name. This was often the case with Winnipeg, Capetown, Moscow, and also, but less often, with New York and others. Frequently the map 'seen' was one showing routes, like the usual text-book sketch-map.

(iii) An image of some very well-known feature or association—by no means always of geographical importance—*e.g.*, "skyscrapers" (New York), "picture of Napoleon's retreat" (Moscow).

(iv) A vague, generalized image of some characteristics of the place—*e.g.*, "sand and sky" or "flat roofs" (Cairo).

(v) A rich and vivid picture, showing that the place is seen as a clear reality. This is very rarely the case, the exceptions being: (*a*) when the student has by reading or in some other manner become acquainted with details of a graphic nature; (*b*) when the place is well known by direct experience—*e.g.*, London.

Of all the places included in any of the lists London is definitely the one that is 'seen' in the greatest variety and correctness of detail, though the reason suggested above is probably not the whole explanation. There is a sameness about many of the mental pictures of London, so that in one test it proved possible to classify them as in the table opposite. (There were fifty-six students, but some of them recorded more than one impression of London, and these impressions were classified separately.)

It is noticeable that only a very small proportion of this set of students visualized *maps* showing London, and in two cases out of the small total of 4 the maps were those used in everyday life by the man in the street (and no doubt by the student herself)—*i.e.*, not atlas or text-book maps. No one would suggest that these students could not visualize a map of Britain showing the position of London at least as well as, if not better than, a map showing other places (which were visualized as maps). They have undoubtedly used maps of Britain often enough to 'see' London on such a map without any effort if required to do so. In this case they did not do so, because their conceptions of the real London were more

prominent—they could imagine London as London *is*. No student 'saw' the printed word LONDON, and only a very few recorded an abstract idea without a visual image of London itself.

GENERAL VISUAL IMPRESSIONS	Traffic and crowded streets	13
	The Thames, shipping, docks, etc.	15
	Buildings (more or less in the mass)	5
	Fog, greyness, etc.	3
PARTICULAR VISUAL IMPRESSIONS	Particular buildings (*e.g.*, Houses of Parliament (8))	14
	Particular places (*e.g.*, Westminster, Paddington, etc.)	9
ABSTRACT IDEAS	*E.g.*, that "London is the greatest city"	7
MAPS	Including "Map of Underground Railways" and "Map of Bus and Tram Routes"	4

Although it is true that a number of the students knew London from direct experience, only a few came from homes in or near London. A fair proportion had come to London for the first time on entering college, and most of those who had visited London before had done so only for brief periods. For the majority London was a place about which they had learned much from pictures, general conversation, and school geography, with a slight amount of direct experience. A study of their impressions leads to the conclusions that many (probably the majority, though by no means all) recorded conceptions gained not from their own experience, but from hearsay, pictures, and other means. One suspects that at least some of the relatively large number who 'saw' the Houses of Parliament recalled a familiar picture-postcard or illustration from a book. That is to say, the students 'saw' London so much more clearly than the other places not

merely because they had direct experience of London, but also because London was known to them by *indirect* means. They had been brought up in a society that knows London, and therefore knew it themselves better than places like Cairo or Capetown.

Nevertheless, although the impressions of London stand out as being fuller and truer than those of other places on the lists, they are by no means perfect, and many are sadly limited or more or less conventional. Yet, limited though they may be, the mental images are *pictures*, many of them including what might be called 'atmosphere.' London is a real place to the students, even to those who have seen practically nothing of it, and notwithstanding the fact that all that they visualize is one tiny fragment or one limited characteristic of it.

For the other places on the lists the number of mental images that are not pictures at all, but words, maps, abstract ideas, or complete blanks, even in the case of places whose names are almost household words, is astonishingly high.

The vast amount of subject-matter covered by school-work in geography makes it perhaps inevitable that a large number of the towns mentioned must remain for the children little more than dots on the map (with possibly some fragmentary knowledge in the form of abstract ideas). Yet the number of cities of great world importance to be left without reality should be as small as possible. There is something bordering on insincerity if the frequent references made in school and elsewhere to, say, Rome or Jerusalem call up an image that is little more than a dot on a map or a printed word. The same applies to other places that figure in every-day conversation over a newspaper. If London can be a reality to a child who has never been to London, surely it should be possible to make Rome and Jerusalem realities also.

It is not intended that there should be any attempt to teach details of buildings, the lay-out of the streets, etc., except where these are of geographical interest. But there should be created in the children's minds clear impressions

concerning the characteristics, the atmosphere, the look and the feel of a place, its sights and sounds, and even in some cases its smells. Not all cities can be known in this way; but if a certain number are vivid realities for him a child should understand that others of which he knows only the names and locations are likewise realities, although he does not 'see' them as such. That is, he is aware of his ignorance. He does not remain complacently content with a dot and a name, but at least feels some curiosity to know what the place is like.

School geography that teaches towns and cities as dots on a map is not the kind of geography which fulfils the highest aims of the subject. It must be understood that the visualizing of cities is used here simply as an example to illustrate a general principle. Reality should be found in all parts of geographical teaching. Whatever topic is under discussion—the Scottish Highlands, the South Downs, work in a South Wales coal-mine or in a Bengal paddy-field, a drought in Australia, the flooding of the Nile, the coming of the Indian monsoon, etc.—everything should be presented so that it can be 'seen'—in many cases also 'heard' and 'felt'—with intimacy and faithfulness to the subject. The aim should be to give graphic knowledge of fewer subjects in preference to slight, and often therefore erroneous, conceptions of many.

It is better for a child to dig deeply and thoroughly in a few places than to remain content with scratching the surface in many. By digging deeply not only does a child find pleasure of discovery, of seeing new interests whose existence he had not suspected, but he also learns what 'digging' is. It is natural for children to take delight in the richness of detail which makes reality, and which the more condensed text-books fail to convey. To do this should prevent the development of that *blasé* attitude sometimes found among young people leaving school, who have 'done' the world ('in outline'), and who vaguely wonder what more geography there can be to know!

Before proceeding to discuss the form that the deep

digging should take it will be as well to consider two protests that might be raised in favour of the surface-scratching. The first is that the junior-school child is still at the stage when he is making first acquaintance with many things. This is, of course, understood, although it applies more definitely to the child younger than nine to ten years. In any case, an older child is not to be debarred from collecting odd scraps of knowledge. A great deal of this is always going on, whether we will or no, in the mere process of his daily life. But at least after the age of eight his interests and curiosity are such that it is natural for a child to seek to dig deeply occasionally, and he should be encouraged to do so. Many of the questions about details which teachers find so embarrassing are evidence of this. (For example, boys aged ten in a class learning about village life in the Punjab and studying the 'Persian wheel' (instrument for raising water) in a picture wanted to know: "What are the buckets made of?" "Where do they get the wood (for the wheels, etc.) from?" "How did they dig the well?" "How does the water get into the well?" etc.)

At about this age geography arouses a curiosity for which no digging is deep enough. Too often it is the meagreness of the information available, in text-books and from the teacher, that discourages a child's keenness to dig, and requires him to scratch the surface somewhere else (because he must be occupied), with resulting discouragement and loss of interest. In addition, the teacher loses opportunities for encouraging persistence and concentration.

The second protest is connected with the fact that a child is expected to possess a certain amount of knowledge of geography by a given age. He will be required to show acquaintance with a variety of facts that will not come his way if he concentrates for too long on a single topic. The answer to this seems to be twofold: (*a*) that if, from the wide variety of children's interests, a topic has been suitably chosen, and if the opportunities it offers are recognized and used, much important 'tool knowledge' can be gained by the way; (*b*) that some, at least, of the general geographical

information demanded (*e.g.*, in an entrance examination) can be quickly learned—partly by intelligent use of the atlas.

In its broadest sense this problem, of ensuring that children create in their own minds correct impressions of geographical subjects, is under consideration throughout most of this book. The whole of a school curriculum in geography, the sequence of work, the details of each lesson or piece of study, should be planned with it in mind. The solution of the problem is greatly furthered by a wise choice of the topic to be studied. Moreover, the best way of securing reality is to see that the subject-matter appeals to the children through its obvious relation to life—in particular to *their* interests in life.

Also, as emphasized by Mr Cons, "Geography is the study of a living world, and only by long spells out of the classroom, in the 'field,' and by first-hand visual contact with the facts of nature and the works of Man, can we hope to develop the sense of geographical reality on which the value of visual methods for the extension of geographical experience finally rests."[1] This truth should be kept in mind while considering *methods* and *materials* whereby reality in geography may be achieved in the classroom.

Methods and Materials

The problem is: How can we "make clear, intelligible, or apprehensible"[2] to a child the geographical subjects which lie beyond his experience? Two methods suggest themselves:

(*a*) By drawing upon the child's experience. (In terms of what he knows a child can attempt to conceive in imagination what he does not know.)

(*b*) By using some form of apparatus as a substitute for or likeness of the subject—*e.g.*, a picture, a model, a cinema film.

[1] G. J. Cons: *Geography and Visual Education* (the Royal Geographical Society, 1947).

[2] A definition of 'to illustrate' referred to by Sir John Adams in *Exposition and Illustration in Teaching* (Macmillan, 1909), p. 17.

The first method depends for its success on the nature of the child's experience and on the teacher's acquaintance with this. For example, a child in the Scottish Highlands will find it easier to imagine hills and mountains than a child who has lived all his life in London or Cambridge. A certain Scottish teacher in a London school did not realize for several years that the children's ideas of hills were based on their acquaintance with sloping, shop-bordered streets called St John's Hill and East Hill. Unconsciously she had assumed that the word 'hills' meant to the children what it did to herself.

Some teachers and writers of text-books for children attempt to refer to things within the children's experience which are so remote from the subject they 'illustrate' that they may actually be a hindrance. For example, children who know how to read a relief map can see that Ireland is not really like a saucer, although the text-book declares it is. There is an unvoiced query in the minds of those children who take things literally as to what happens beyond the rim underneath the sides of the saucer. All such reference to dishes, basins, and kindred apparatus should be made with caution, and the teacher should remember that these terms are best used when they come from the children (*cf.* p. 274).

The above is intended merely as a note of warning. The importance of using experience should be clear from the frequent reference made to it in other chapters.

The second method—*i.e.*, the use of what might be called illustrative apparatus—is also of great importance, and will be considered throughout the rest of this chapter.

The Use of Pictures

A well-classified collection of suitable pictures is part of the stock-in-trade of every teacher of geography. Not only does the use of pictures enable him to economize in words and time, but it is on them alone that he must often rely to convey impressions of subjects remote or complex (*e.g.*, the appearance of a dockyard, an Indian bazaar, the scenery among

snowclad mountains), or points about size and structure (*e.g.*, of a Kirghiz *yurt*, an Egyptian *sakieh*, an Eskimo *kayak*). Proof of this is forthcoming whenever a picture is

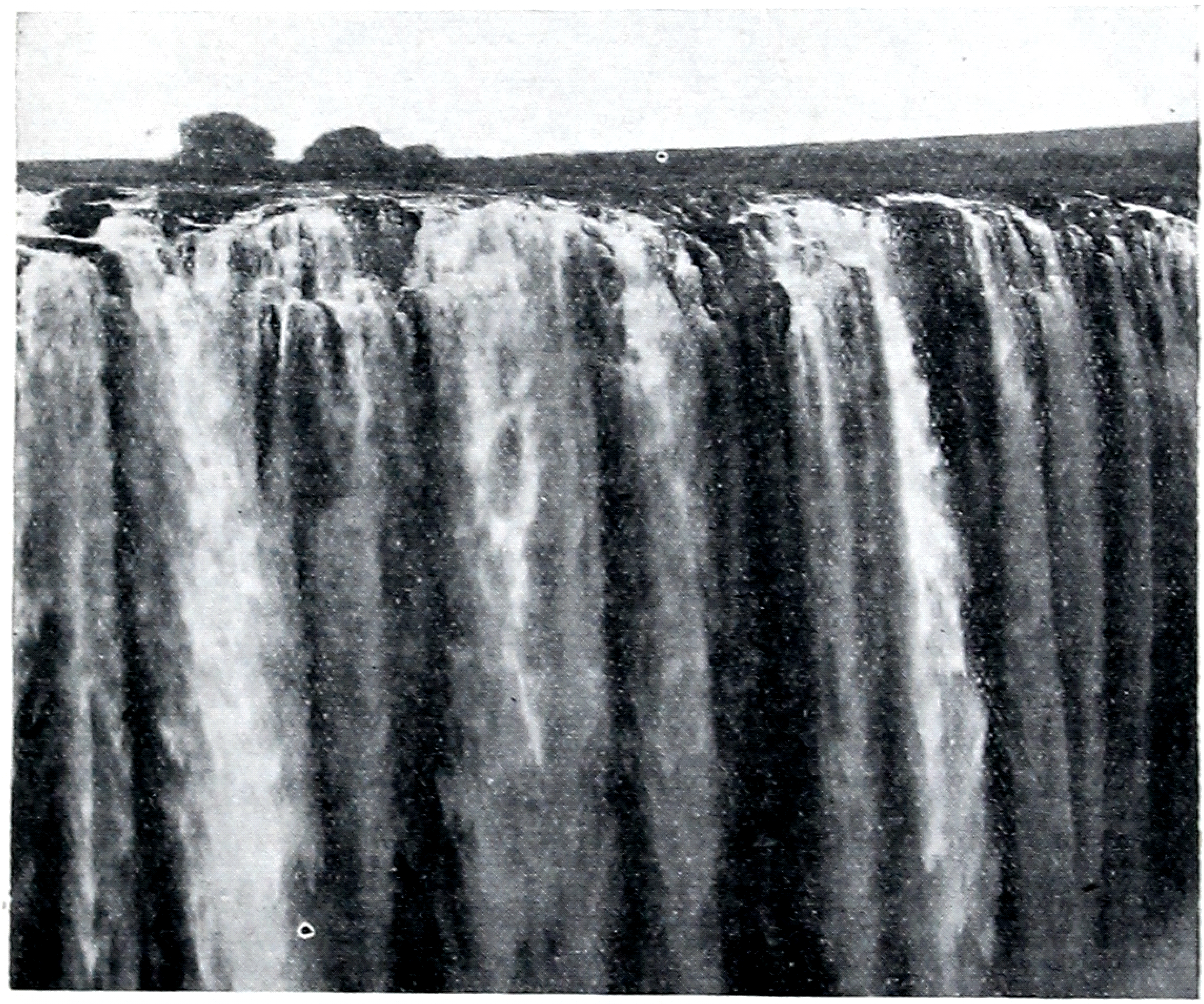


FIG. 29. VICTORIA FALLS (RHODESIA): MAIN FALLS FROM THE RAIN-FOREST

At first glance this picture appears to show a normal waterfall. There is little or nothing to indicate scale, the nature of the surrounding country, etc. Yet a little thought suggests that the position in which the photographer stood (in relation to the falling water) was an unusual one, impossible in the case of many waterfalls, unless an aeroplane could be used.

By courtesy of the High Commissioner for Southern Rhodesia

greeted with such a remark as "Oh, so *that* is what it is like!"

The picture collection must be large and varied. While recognizing the fact that one can use too many pictures in a lesson, it is true that for many subjects one alone is not enough. A picture of a camel drinking at a pool does not adequately represent an oasis! Suppose the oasis is that of

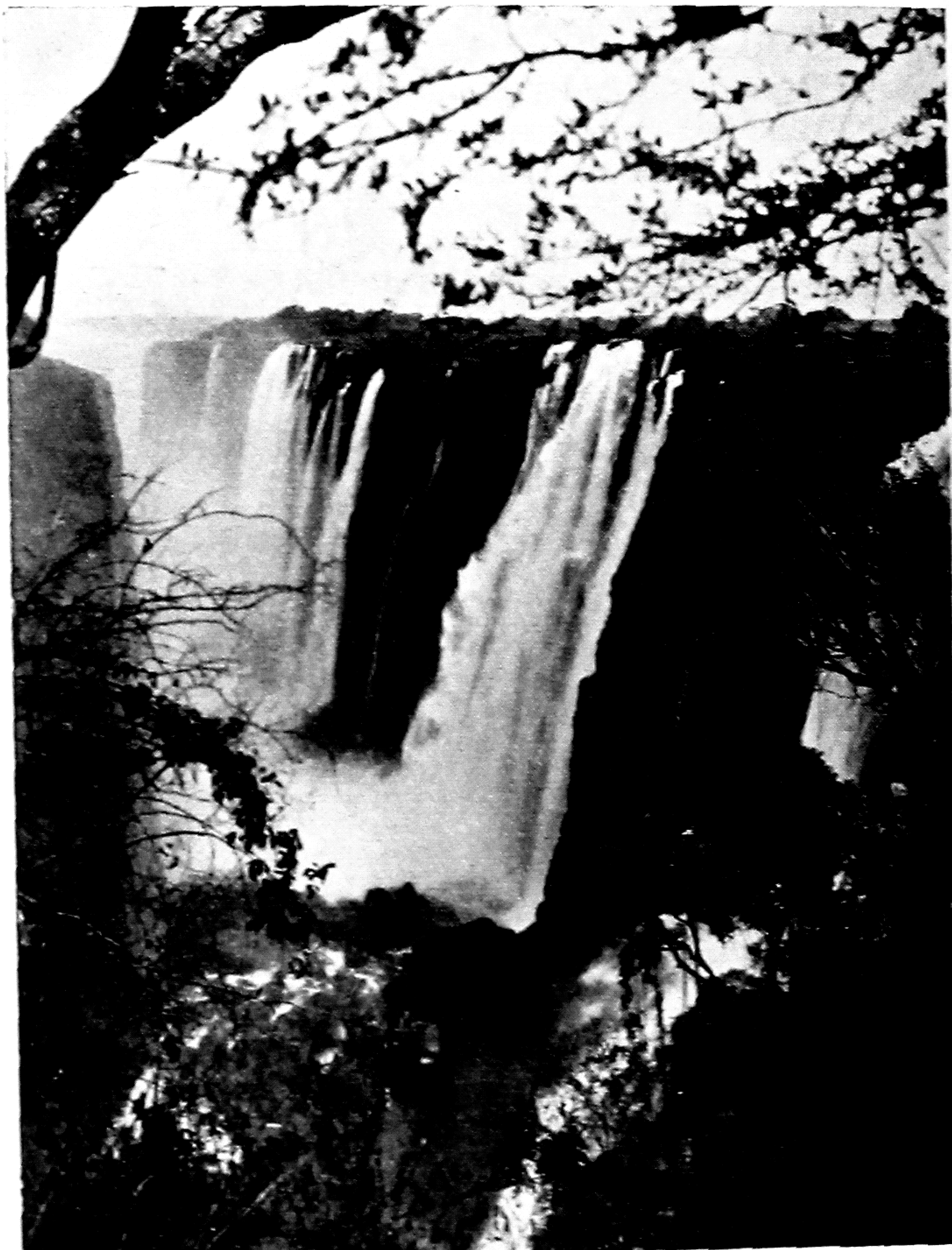


FIG. 30. VICTORIA FALLS: VIEW OF THE EASTERN CATARACT

A picture which shows more clearly than Fig. 29 the characteristics of the Victoria Falls. This photograph was taken from the point marked by an arrow in the map on p. 164. It indicates the fact that the water falls into a gorge which crosses the river-bed transversely. The opposite side of the gorge can be seen on the left. The photograph was taken at a time of low water. This is suggested partly by the exposure of loose boulders in the bed of the gorge. Photography is impossible here when the river is full, on account of the spray.

By courtesy of the High Commissioner for Southern Rhodesia

Tafilet. One needs also pictures of walled gardens, palm-groves, narrow lanes, and markets (*souks*). The inadequacy

FIG 31. VICTORIA FALLS FROM THE AIR

A picture which throws light upon those in Figs. 29 and 30. This and other photographs are better understood when studied in conjunction with the map in Fig. 32.

By courtesy of the High Commissioner for Southern Rhodesia

of a single picture is suggested by Figs. 29, 30, and 31. It may be that some such consideration as this is in the minds of those who assert that a picture limits the imagination. The proper use of pictures should encourage the imagination

by giving it material to work upon. It should limit imagination only in the right way, by preventing misconception.

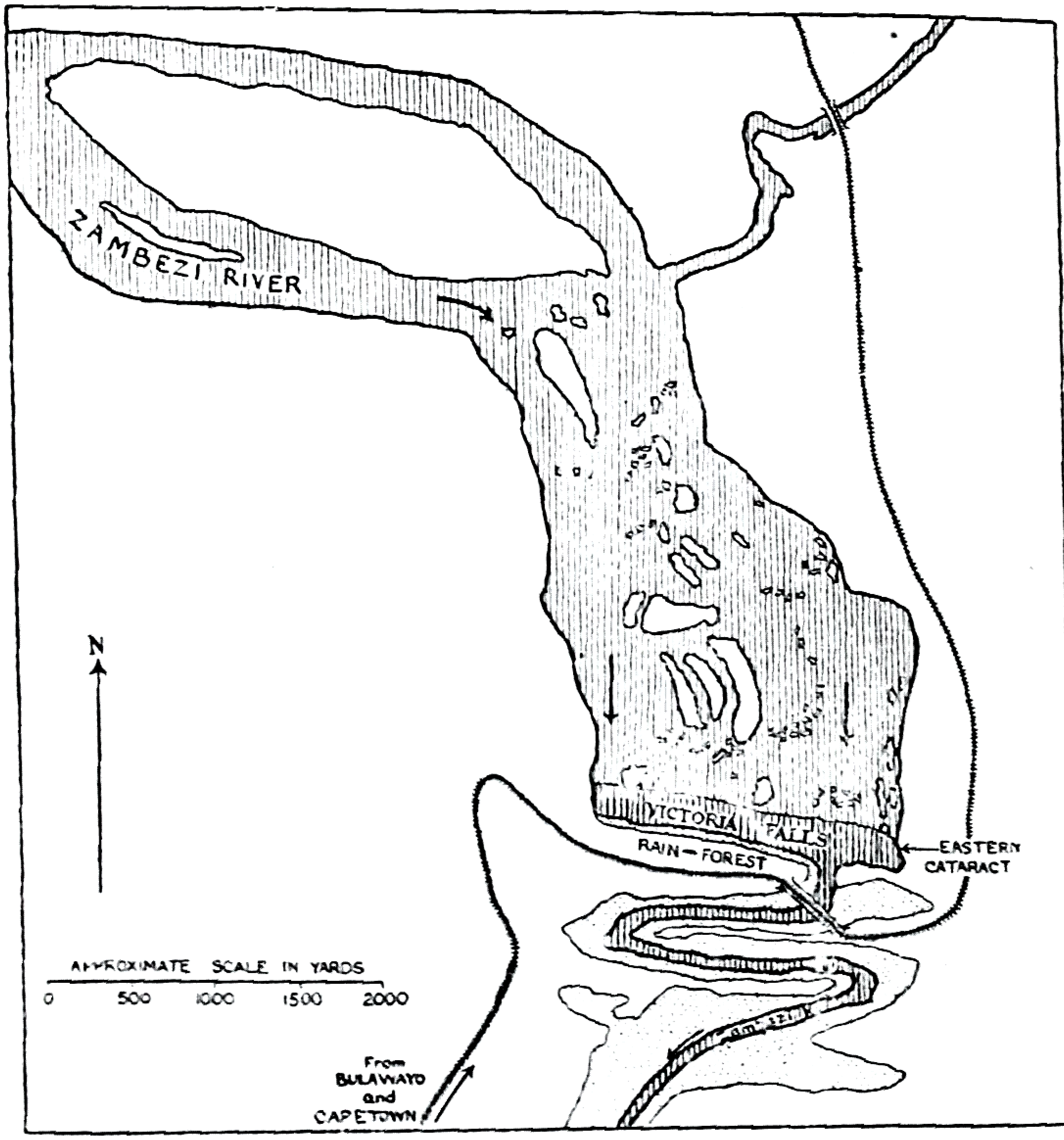


FIG. 32. MAP OF THE ZAMBEZI RIVER IN THE NEIGHBOURHOOD OF VICTORIA FALLS

By the help of the map it is possible not only to gain a clearer understanding of the pictures, but also to learn something about the neighbourhood of the Falls outside the limits of the photographs—*e.g.*, none of the pictures given includes the zigzag course of the gorge below the fall.

Based, by permission, on a map published by the Rhodesia Railways, Ltd.

Children need to be trained to read pictures, and with this end in view teachers should make opportunities for discussing pictures with small groups of children—say, of five to ten individuals. When they are free to make

comments and suggestions without fear of 'giving themselves away' children sometimes reveal difficulties that are enlightening even to experienced teachers. The younger children, and those who have little experience of pictures outside school, sometimes find stumbling-blocks in such details as a patch of shadow or an artistic device, which the experienced eye of the teacher fails to notice. Miss R. Fleming has pointed out that until they have studied pictures of places they know well, and have thus come to realize the limitations of pictures, it should not be assumed that children can read pictures as easily as does an adult. This is probably chiefly true of children from poor homes. Holiday snapshots and postcards probably do much to develop a 'picture-sense' with more fortunate children. Yet the value of taking a camera on school expeditions and of encouraging the children to criticize the photographs produced must not be overlooked in this connexion. Among the more obvious facts which this should emphasize is the loss of relative importance in certain details, particularly with the absence of colour and the limitation caused by the cutting of the picture at its margins, so that it shows only a fragment of what is around and before the photographer. See note on air photographs, p. 189.

To use pictures intelligently it is, of course, necessary to realize their deficiencies. None can convey sensations of heat, cold, smell, etc. Sound and movement must be added in imagination—*e.g.*, to pictures of a waterfall, a ship at sea, an Egyptian peasant working his *shaduf*, a camel caravan crossing the desert, the interior of an iron-works or textile factory. Complete knowledge cannot be conveyed by a picture alone any more adequately than a place one visits is represented by the snapshots one brings home. Moreover, a picture even in colour portrays but a single moment. It is not easy to obtain pictures of the same place at different times of the day or at different seasons of the year.[1] With the above

[1] See, for example, two of the coloured prints in J. Fulleylove and J. Kelman, *The Holy Land*, first edition (Black, 1902; reprinted 1912), facing pp. 82 and 84. They are copies of paintings of the view towards Jerusalem from the Mount of Olives, at sunrise and just after sunset.

points in mind the student might consider the value of passages like the following as a means of supplementing pictures of the same subjects, by suggesting movement, sound, changing colour, etc.:

> On the crest of a sand-dune appear two Bedouins leading their heavily laden camels. They cover the ground with long, swinging strides. They courteously greet us with the Arab salutation "Peace be with you" as they pass. . . .
>
> Over the desert comes a sinister light, the golden world grows dim, a grey sadness drifts across the darkening plains. Again we hear in the distance the low, booming voice of the storm. . . . A puff of hot air rises, dances along the sand, and whirls into nothingness. Another and yet another follow, the sand ceaselessly dancing till the desert is all alive and moving. The sun is wrapped in a tawny orange robe. From the south comes a rush of mighty wind; the great spaces are blotted out; the sandstorm has returned. . . .
>
> At sunset the wind ceases, the twilight creeps onward, the sun drops over the edge of the world, the sky turns a vivid, translucent copper, with one broad swathe across the heavens of deep blood red.
>
> Seated on the crest of a desert wave, we watch the Fire-god sink from the lurid sky while the golden sands turn purple. A fox, unaware of our presence, slinks along the next hollow, its footprints causing the fine sand to trickle in tiny streams. The silence is absolute.
>
> A line of tall palm-trees, black silhouettes, slowly move their drooping feathery branches, bending their graceful heads to each other.[1]

Incident in a Story of Egyptian Peasant Life

One night it happened that Ibrahim was compelled to work late at his *shaduf* to raise water. It was very dark, and the hour was very tranquil, no sound being heard save the occasional scream of the owl, the mighty flow of the river, and the songs of the other villagers similarly engaged at various distances along the banks. Ibrahim had no heart to sing, for

[1] Lady Evelyn Cobbold, *Wayfarers in the Libyan Desert* (Humphreys, 1912).

he was thinking of his disappointment. He was roused from his reflections soon after the rising moon had flung its dull yellow light over the swelling desert to the east by observing the women of the village approaching, each carrying a supper of boiled lentils and bread for the labourers.

Ayshë came and sat down by the side of her husband. They fell to talking of their misfortune, and at last Ayshë declared that she would make a pilgrimage to the tomb of Sheik Seid. Ibrahim embraced his wife with a heart full of gratitude, and forgot for a while that his *shaduf* stood still. When she went away she heard his voice burst forth through the night in song, and tremble afar across the country; whilst his companions, cheered by his hearty accents, took up the chorus, and, working with redoubled vigour, sent the water dashing beneath the moonlight over the fields in a thousand little channels, like so many arrows of silver.[1]

All children need practice in picture-study—*i.e.*, in using pictures to obtain information. Some children will enjoy looking at a picture, yet retain no lasting impression of it. They need training not merely to observe details in a picture, but also to apply their imagination and to formulate in their minds the facts which a picture conveys. Probably the best way of securing study of real value for the purpose on hand is to see that the pictures are approached with definite questions in mind, or that they are accompanied by appropriate headings or comments.

The beginner in teaching will probably also find that many blunders in organization are saved if the following points are kept in mind.

Organization in the Use of Pictures

Picture-study should not be considered a pleasant addition to a lesson, but used as an integral part of it. A mistake commonly made by beginners in teaching is that of producing pictures during the lesson, after a point has been discussed, with a statement such as "Now I will show you a picture of

[1] Bayle St John, *Village Life in Egypt*, vol. ii (Chapman and Hall, 1852). I have abridged the passage slightly.

it." Forthwith a picture is passed round among the class, often with a certain amount of loss of order, or at least a waste of time. Such a method does not allow suitable observation of the picture, and is wasteful in other ways. If picture-study cannot be a well-organized part of the lesson it is best left to take place at another time, either before or after the lesson. A student who is planning work which demands the use of pictures might consider the following possible methods:

(i) *Pictures studied during the Lesson.* This method is best:

(*a*) If the lesson is to pass through certain preliminary stages which will lead naturally to the reference to pictures—*e.g.*, to solve certain problems.

(*b*) If the pictures are large enough for class study, or else sufficient in number for individual use. Otherwise arrangements must be made for them to be studied by the class in groups, children not so occupied being engaged in some other activity—*e.g.*, in map-work or reading.

(ii) *Pictures studied before the Lesson.* This method is best:

(*a*) If the pictures are too small or too few to be effectively used by a large class without waste of time in the lesson.

(*b*) If the pictures give background knowledge necessary for a proper understanding or appreciation of topics to be considered in the lesson. This may be either to ensure correct visualization of subjects to be described or to give atmosphere and setting which will be taken for granted in the lesson.

(*c*) If the pictures are to be used to arouse interest. A valuable piece of geographical study may often be introduced through a child's question about some detail in a picture which has aroused his curiosity.

(iii) *Pictures used after the Lesson.* This is best if the pictures are to be studied in the light of knowledge given in

the lesson. Often in this case the lesson should lead up to definite instructions or guidance for full use of the pictures.

Of the three methods that which involves study of the pictures before the lesson will generally be found to be the most satisfactory. The only drawback to it is a practical one—that it involves obtaining the pictures, and probably posting them in the classroom, well before the lesson period. This difficulty is greatly reduced if the teacher has at hand a well-classified collection of pictures. (For information concerning sources of pictures see p. 190)

Pictures reproduced clearly and well from photographs are best as a rule.[1] A picture that is artistically beautiful, but not literally true in details of colour, proportion, etc., is not as a rule suitable for use in a scientific study. Many posters, beautiful in themselves and attractive to the adult, who does not take them literally, are quite unsuitable for the younger children as a source of geographical information. More often than not it is a mistake for a teacher to spend laborious hours preparing illustrations. Printed pictures can generally be obtained with a little trouble for most of the usual topics of school geography, and a few years of collecting should provide a teacher with a selection to hand. If pictures are not available it is far better to go to the blackboard and indicate what is meant by a sketch—which the children understand to be rough because they see it grow rapidly in front of them—than to present a home-made picture not free from inaccuracies, although the fact is hidden from the class by the obvious care expended in its production. Equally to be condemned are certain published pictures printed in exaggerated colours, which show 'all the facts' associated with a given popular topic (*e.g.*, Eskimo life) by an improbable array of objects set out in the foreground and an impossible coincidence of happenings in the middle distance.

[1] The children's enjoyment of a coloured picture is partly due to their satisfaction at seeing something 'true to life.' It is to be hoped that the new processes of colour photography and reproduction will make good coloured pictures more plentiful in children's books and for class illustrations

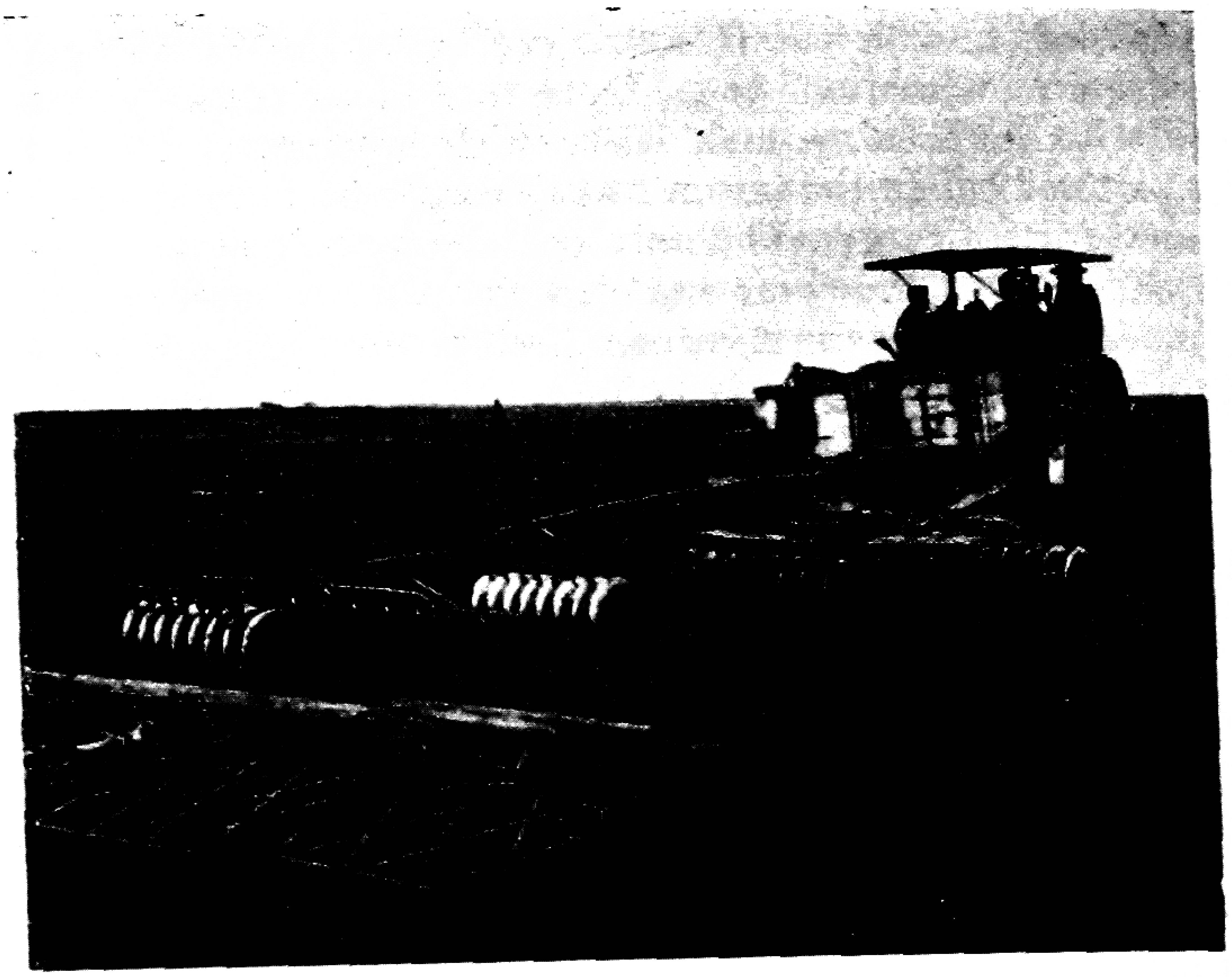


FIG. 33. DISKING AND HARROWING AT SHELLBROOK, SASKATCHEWAN, CANADA
Photo E.N.A.

FIG. 33. EXAMPLE OF PICTURE-STUDY: I (*cf.* Fig. 34)

It is supposed that this picture is being used with a class of children who are learning about wheat cultivation on the prairies of Canada. The following instructions are given to guide their study:

"This picture shows a scene in the prairie country of Saskatchewan in early spring. Compare it with the English farming scene in Fig. 34. Make a list of the differences in (*a*) the surface and appearance of the countryside and (*b*) the methods of working and making use of the land shown in the two pictures."

A discussion, developed from the children's observations, might include some or all of the following facts concerning the land shown in the above picture, the extent to which any one is pursued depending on the children's age, capacity, and background. A fair proportion could be expected with children of nine to ten years.

(i) The horizon appears level and unbroken, similar to that seen at sea. The land is extraordinarily flat for vast distances, no obvious dip or rise appearing between the observer and the horizon. There are no permanent features (trees, etc.) to obscure the distant view.

Large elevators,[1] so far away as to seem insignificant, stand up on the horizon as the only land-marks.

(ii) The land is not broken up into a patchwork of fields. The countryside looks like one vast field, in which hedges are absent, and which appears to be used in the same manner as far as the eye can see. To a certain extent this reflects the uniformity of soil (and rock) conditions, a fact which could not, however, be *deduced* from the photograph. (Soil conditions are by no means entirely—or necessarily largely—determined by the nature of the rocks *in situ*; nor, of course, does a change in type of land utilization necessarily indicate a change of soil or of any other condition! Nevertheless, in an English landscape, even in a photograph, it is often possible to trace the effect of differences in the underlying rocks within short distances—for example, by a change from cultivation to rough pasture—*e.g.*, in parts of North Kent, where the fertile Thanet sands are overlaid, even for a small area, by infertile gravels; or in parts of South Dorset, where the mixed soils of the Wealden Beds are cultivated up to the line along which they meet the rough pasture of a limestone hillside. Children who, through local studies, have become aware of the importance of geological differences in Britain could appreciate the comparative uniformity of rock conditions which helps to account for the monotony of the prairie country. *Cf.* pp. 269–276.)

(iii) No town or village can be seen. Some of the elevators[1] may possibly indicate the sites of farmhouses or the existence of a railway. There is nothing of historical interest in the landscape. Elevators and steam-tractors are essentially modern. An English landscape in farming country often includes a church-tower, a farmhouse, or some other feature suggesting by its comparative antiquity that the land has been occupied for generations, probably many centuries. The country shown in this picture has been developed within a generation or two.

(iv) The steam-tractor, with its equipment of several sets of disking apparatus and harrows, is obviously suitable for use in such a vast stretch of level land.[2] Large cultivators and mechanical contrivances are necessary not only to do the maximum amount of work, but to do it speedily. Here two processes are being performed at once. The grain must be sown quickly, since the growing season is limited.

[1] In the larger original photograph at least four elevators could be seen. Reduction of size has made it difficult to detect them.

[2] *Cf.* the passage quoted on pp. 179–180.

FIG. 34. PLOUGHING AT MORECOMBELAKE, DORSET, WITH LYME REGIS BAY IN THE BACKGROUND

Photo by courtesy of "The Times"

FIG. 34. EXAMPLE OF PICTURE-STUDY: II (*cf.* Fig. 33)

A discussion arising out of a study of this photograph might bring forward the following facts:

(i) The country is noticeably undulating. This is true not only of the middle and remote distance, but also of the single field in the foreground. The true horizon cannot be seen on account of the hill slopes which rise above it. Moreover, the distant view is partly blocked by a hillside and trees towards the left.

(ii) The landscape is characterized by its patchwork of fields, bounded by lines of hedges. The tints of the fields vary, suggesting that they may be used for different crops, or that some are newly ploughed and others unploughed. Probably a number are laid down to grass, although this cannot be stated with confidence from a study of the picture alone. Part of a sea inlet appears in the middle distance. This cannot be called 'typical' of English farming country, but, by way of contrast, it is of interest to children to find out how many hundreds of miles from the nearest sea-coast is the prairie country shown in Fig. 33.

(iii) A town[1] can be seen in the distance beyond the bay. It is quite typical of the English countryside that a town or village is seldom far away—at least in agricultural areas. Settlements are comparatively few and far between in the thinly peopled prairies of Saskatchewan, represented in Fig. 33.

(iv) A steam-tractor with a train of multiple apparatus would be unwieldy here. A smaller instrument is required to adapt itself to an undulating surface and to work the small fields, with their awkward shapes and corners. *Cf.* the curve which is being taken by the plough in Fig. 35. It must not be ignored, however, that tractors and mechanical farming instruments are becoming common in many parts of England, and, as has been pointed out by Mr A. G. Street,[2] the English farmhand driving a motor plough has a task demanding much concentration and skill—*e.g.*, in adjusting the instrument to the varying surface conditions of the fields.

(v) The season is early autumn, for the trees are not bare and the stubble on the unploughed land is still fresh. It is likely that the soil is being prepared for autumn sowing—a possibility due to the comparative mildness of the winter in South-western England. The henhouse in the field suggests that reaping has not long been finished, and that hens have been put on the field to gather any grain left behind. This also indicates the season. In addition, it suggests an attempt to make the maximum use of the land. The farming is more intensive here than that shown in Fig. 33.

NOTE. Copies of the original photographs from which Figs. 34 and 35 have been reproduced may be obtained from *The Times* Art Department, Printing House Square, London, E.C.4.

[1] The town could be discovered easily in the larger original.
[2] In *Country Days* (Faber, 1933).

FIG. 35. AT PENBERTH COVE, THREE MILES EAST OF LAND'S END, CORNWALL

The field is being ploughed for sowing potatoes. Daffodil-beds are seen on the headland behind.

Photo by courtesy of "The Times"

FIG. 35. EXAMPLE OF PICTURE-STUDY: III

A Picture that provokes Inquiry

If this picture is examined by children (aged about eleven plus) who have some knowledge of agriculture in Britain the following points may be brought forward, to some extent, at least, by the children themselves:

(i) The use of the land shown in this photograph has certain characteristics uncommon in England. In spite of the fact that its slope is quite steep and that parts of it are rugged with projecting boulders, the distant hillside is closely cultivated, even small fields being subdivided. This is particularly noteworthy in view of the fact that in many parts of England, especially to the west, ploughed land has ceased to pay, and is given over to grass. Yet here the photograph shows cultivated patches adjoining the crumbling cliff-face at the very end of the headland. It must be costly in labour to work such land in this way. Moreover, intensive cultiva-

tion at Land's End cannot be explained by reference to near-by markets in great cities. The solution is approached when it is recognized that the crops under cultivation are peculiar—early vegetables and flowers. Climatic conditions in South-western Cornwall make it possible for market-garden produce to be ready so early that it will fetch high prices, covering costs of production and of transport to all parts of Britain. Exposure to gales is a problem in such a situation. The need for shelter from wind is one of the reasons why plots are small and walls numerous.

(ii) A closer study [1] of the picture suggests that the daffodil-beds are placed with regard to aspect, and that the position on the hillside is actually an advantage, since the beds are tilted sunward. The tree-covered slope on the right, facing in a different direction from any of the daffodil-beds, was certainly not receiving the full force of the sun when the photograph was taken. The cultivated slope in the foreground has a sunnier aspect due to a slight change in its direction.

(iii) The shadows of the horses, buildings, etc., are not long for the time of year. (It must be very early spring, for the trees are still bare, although the daffodils are in leaf.) Therefore the time must be fairly near midday. This means that the ploughman, whose back is to the sun, is facing in a direction of which north is a component. Therefore all the cultivated land has a warmer aspect than that of the tree-covered hillside.

Reference to a large-scale map [2] shows that Penberth Cove opens towards the south-east, the valley behind it running from north-west to south-east. The cultivated valley-side in the middle distance faces approximately south-westward.

There is an advantage in growing early flowers and vegetables on a hill-slope, provided that it receives sufficient sunshine, for a sunny slope combines shelter from cold winds with intensified warmth. In fact, when the sun is not high overhead the steeper the slope the more heat will it receive over a given area, while the sun shines directly upon it. The earliness of the crop is likely to be increased thereby, even in Cornwall. Hence the close cultivation of relatively steep slopes—in the remotest corner of England!

[1] More easily possible in the larger original.

[2] *E.g.*, 1″ Ordnance Survey, popular edition, Sheet 146.

Three examples of picture-study are given on pp. 170–175. They are intended to illustrate (*a*) the possibility of obtaining definite and detailed information from pictures; (*b*) the value of contrast in the use of pictures; and (*c*) the possibility of using a picture to provoke inquiry.

It should be noticed that in order to satisfy the queries raised by a study of the photograph in Fig. 35 reference may be needed to atlas, text-books, local literature (or local knowledge or inquiry), and large-scale local maps. The knowledge gained through this inquiry illustrates or introduces several important geographical facts.

The Use of Visual Aids

Many of the facts about the study of pictures apply equally to the use of lantern-slides, cinema films, etc. Above all they should be regarded not as exciting extras, but as sources of information to be studied, like maps, as material essential to the lesson in which they are used.

Every teacher who has used one realizes the extraordinary value of an epidiascope in geographical teaching. It has the advantage of enabling any small picture (*e.g.*, a snapshot or postcard), a portion of an Ordnance or atlas map, a sketch prepared by the teacher, a child's drawing, a list of figures, etc., to be thrown on the screen enlarged sufficiently to be studied by a class of forty to fifty or more. Practically any small pictures or objects, including the diagrams or coloured plates in a book, are thus potential class illustrations. In an epidiascope enlargement of a photograph details are sometimes revealed that have passed unnoticed in the original. A good epidiascope also has the advantage of showing ordinary lantern-slides so brilliantly that they can be used without complete darkness.

Episcopes (with no attachment for lantern-slides) are useful, although some are poor in performance and awkward to manipulate. Film-strip projectors are likely to become popular. A film strip can be made quite cheaply, and has

the advantage of providing a series of illustrations ready to hand for a given subject. In this lies a possible drawback: the fact that the illustrations are assembled may determine the course or nature of a lesson, when a different combination or sequence would be preferable.

In a well-equipped geography room which can be darkened at any moment, and where the epidiascope is permanently set up, it can be used for a few minutes at a time simply as a piece of classroom apparatus. Whether or no this is possible, the teacher should endeavour to avoid the lesson which becomes little more than a picture-show.

The beginner will find the following a good working rule, though not without exceptions. Having given any necessary statement to introduce a picture, it is a good plan for the teacher to refrain from commenting on it, and to leave it on the screen for the children to study in silence for a few moments, and then to let the remarks and questions come from the class. There should be freedom for individual children to come up to the screen to indicate details. Any picture should be available for a second or third showing if required—*e.g.*, to verify a point or make a comparison. The picture-study should be followed by some kind of summary or discussion in which the facts learned are formulated. In short, the epidiascope or film-strip pictures should be used in no essential way differently from ordinary class illustrations.

That the cinematograph should be included as a part of school equipment is now becoming more widely recognized in this country. Its value in geographical teaching can scarcely be exaggerated, since so many geographical illustrations require movement and sound added to them before they can give impressions true to life. A still picture of Chinese peasants planting rice does not convey their constant, methodical, unhurried yet rapid movement. No words can describe to perfection the passage of a ploughshare through the soil, the management of an Eskimo *kayak*, the shearing of a sheep, the gait of a camel, the movement of molten iron

in a foundry. Only a film can present these things adequately to children who have never seen them. It must be recognized, however, that there are some subjects to which the cinema film fails to do justice, since, even if there is no flickering or jerking, their essential stillness makes them unsuitable subjects for moving pictures. Mountain scenery is an example of this; yet no still picture can do justice to the sight ' nd of mountain torrents, or to the physical labour entailed in mountain-climbing. For a fuller consideration of the use of films in geographical teaching and for information about projectors, film libraries, etc., reference should be made to the works mentioned at the end of this chapter.

In addition to those referred to so far there are other forms of illustration which make greater demands on the children's creative powers, both mental and manual. There are, for example, some subjects of which no pictorial representation can be obtained, and for which the teacher may have to rely on description alone. It has been pointed out elsewhere that reliable accounts gleaned by the teacher from books of travel should have a definite place in geographical teaching. A few additional points about their use may be mentioned here.

The Use of Descriptive Extracts from Literature

(i) The authority quoted must be a good one, whose observation and recording can be trusted.

(ii) It should be made quite clear to the class: (*a*) that the subject described is only one, possibly out of many quite different examples—*e.g.*, of a Bedouin encampment, a Canadian lumber-camp; (*b*) that one cannot generalize about a large region from a description of a journey through a small part of it; (*c*) that the impressions gained by one eyewitness may be quite different from those obtained by another of the same subject; (*d*) that in many parts of the world certain facts of human geography are changing rapidly, and a description may soon become out of date in detail even though the general impression may remain true.

(iii) When the style of the author has nothing particularly to commend it, or if the actual words of the eyewitness are not essential, it is generally best for the teacher to tell the facts in his or her own words.

(iv) When the passage is of special merit there is often much to be gained by studying it in some detail. For this purpose it should be duplicated to allow careful study by each child, who should have time to read it more than once, to dwell upon it, considering the full meaning of a phrase here, the implication of a word there. Questions may be asked, pictures, etc., referred to.

Two passages of this type are given below. They have been selected partly on account of the geographical contrast they offer, thereby suggesting the value of contrast in illustration. These particular passages are best studied by children aged eleven plus who have some acquaintance with the subjects. They might also afford an introduction to further geographical ideas—*e.g.*, about extensive and intensive cultivation. It goes without saying that both need to be supplemented by pictures and other sources of information.

The passages include details that need modifying, since they were written several decades ago. Yet the general features emphasized have a more permanent truth, and the language in which they are described is worth study on its own account. The present writer has been surprised to find the number and variety of phrases in Passage I which have struck children (aged ten to eleven plus) as suggesting the levelness and expanse of the North American prairies.

Passage I: In the Prairie Country, United States

Here is the view: One railway track and a line of staggering telegraph poles ending in a dot and a blur on the horizon. To the left and right, a sweep as it were of the sea, one huge plain of corn land, waiting for the spring, dotted at rare intervals with wooden farmhouses, patent self-reapers and binders almost as big as the houses, ricks left over from last year's

abundant harvest, and mottled here and there with black patches to show that the early ploughing had begun. The snow lies in a last few streaks and whirls by the track; from sky-line to sky-line is black loam and prairie grass so dead that it seems as if no one year's sun would waken it. . . .

They work for harvest with steam-ploughs here. How could mere horses face the endless furrows? And they attack the earth with toothed, cogged, and spiked engines that would be monstrous in the shops, but here are only speckles on the yellow grass. Even the locomotive is cowed. A train of freight cars is passing along a line that comes out of the blue and goes on till it meets the blue again. Elsewhere the train would move off with a joyous, vibrant roar. Here it steals away down the vista of the telegraph poles with an awed whisper—steals away and sinks into the soil.

Passage II: In Upper Egypt, from a Nile Boat

All this while the land of Egypt marched solemnly beside us on either hand. The river being low, we saw it from the boat as one long plinth, twelve to twenty feet high of brownish, purplish mud, visibly upheld every hundred yards or so by glistening copper caryatides in the shape of naked men baling water up to the crops above. Behind that bright emerald line ran the fawn- or tiger-coloured background of the desert, and a pale blue sky closed all. There was Egypt even as the Pharaohs, their engineers and architects, had seen it—land to cultivate, folk and cattle for the work, and outside that work no distraction nor allurement whatever, save when the dead were taken to their place beyond the limits of cultivation. When the banks grew lower, one looked across as much as two miles of green-stuff packed like a toy Noah's-ark with people, camels, sheep, goats, oxen, buffaloes, and an occasional horse. The beasts stood as still, too, as the toys, because they were tethered or hobbled each to his own half-circle of clover, and moved forward when that was eaten. Only the very little kids were loose, and these played on the flat mud roofs like kittens.

No wonder 'every shepherd is an abomination to the Egyptians.' The dusty, naked-footed field-tracks are cut down to the last centimetre of grudged width; the main roads are

lifted high on the flanks of the canals, unless the permanent way of some light railroad can be pressed to do duty for them. The wheat, the pale ripened tufted sugar-cane, the millet, the barley, the onions, the fringed castor-oil bushes, jostle each other for foothold, since the Desert will not give them room; and men chase the falling Nile inch by inch, each dawn, with new furrowed melon-beds on the still dripping mud-banks.[1]

In connexion with the use of accounts by travellers the B.B.C. travel talks and broadcast lessons must not be ignored. Their relative value is probably greatest in rural schools at a distance from libraries.

The Use of Diagrams

Every student knows the value of diagrams in making clear facts that are difficult or impossible to comprehend when presented in words alone. Familiar examples are: the explanation of the seasons, the movement of air in a cyclone, the formation of river meanders, the structure of the Weald. The student also knows that it is desirable to express facts about relative areas, climatic conditions, production and trade, etc., not in mere figures, but in a diagrammatic form that can be grasped quickly because it makes an immediate appeal to the eye. Older children and students can interpret diagrams that are highly symbolic partly because they can understand abstractions, but the teacher must not lose sight of the fact that in the junior school children are *learning* to interpret diagrams, and that their use of them must be adjusted accordingly.

To represent diagrammatically facts which they already know comes naturally to many children of junior-school age. In fact, it is a safe rule to let a child approach the interpretation of diagrams through constructing diagrams of his own. In this way it is possible to give him an understanding of the symbolism, approximation, generalization, etc.,

[1] These extracts are taken from Rudyard Kipling's *Letters of Travel* (Macmillan), with the author's kind permission. The former is from "Across a Continent," the latter from "Up the River."

characteristic of diagrams. Otherwise he is apt to take them too literally, especially when they are of a pictorial nature. For this reason some of the diagrams used in children's books are open to criticism, being over-symbolic, or even remote from the facts they are intended to illustrate. For example, the part played by the Western Ghats in causing an area of rain-shadow on the Deccan Plateau has recently been illustrated by portraying a woman carrying an umbrella tilted sideways, *sheltering* from rain an area of 'rain-shadow' to leeward of the umbrella! It has long ago been pointed out[1] that careful teaching is necessary to ensure that children do *not* imagine a mountain-range to act like a wall (or an umbrella) in 'sheltering' leeward regions from rain.

Pictorial diagrams are frequently used to represent relative quantities, values, etc. For example, the numbers of sheep, reared in Australia, Argentina, and South Africa, are sometimes shown by a row of sheep of assorted sizes, one for each country. In one book a chick is placed beside a hen to show the increase in poultry-farming in a number of years in a given country. The appeal to the eye is in some ways a strong one, but three points of criticism suggest themselves:

(i) The children are likely to visualize the sheep, etc., too concretely—*i.e.*, in three dimensions, thus multiplying the differences many times (unless the diagram is intended to show the facts in three dimensions, which is rare). There is a danger of this even when the fact that only the areas (or the lengths) of the sheep, etc., are to be compared is stated below the diagram.

(ii) The purpose of diagrams of this kind is to enable quick and accurate comparison. But areas of irregular shape are difficult to compare with real precision. The hen is merely "ever so much bigger" than the chick. A unit of length or of a simple square is much more suitable for children, though perhaps less spectacular at first glance. In any case, children who are able to use diagrams of this kind are quite capable of appreciating the more symbolic form, and do not need the additional attraction of a picture.

[1] *E.g.*, by J. Fairgrieve, *Geography in School*, pp. 24–25.

(iii) Accurate diagrams of a pictorial kind could not be constructed by junior-school children as a general rule. It is sounder educationally to use diagrams that children can

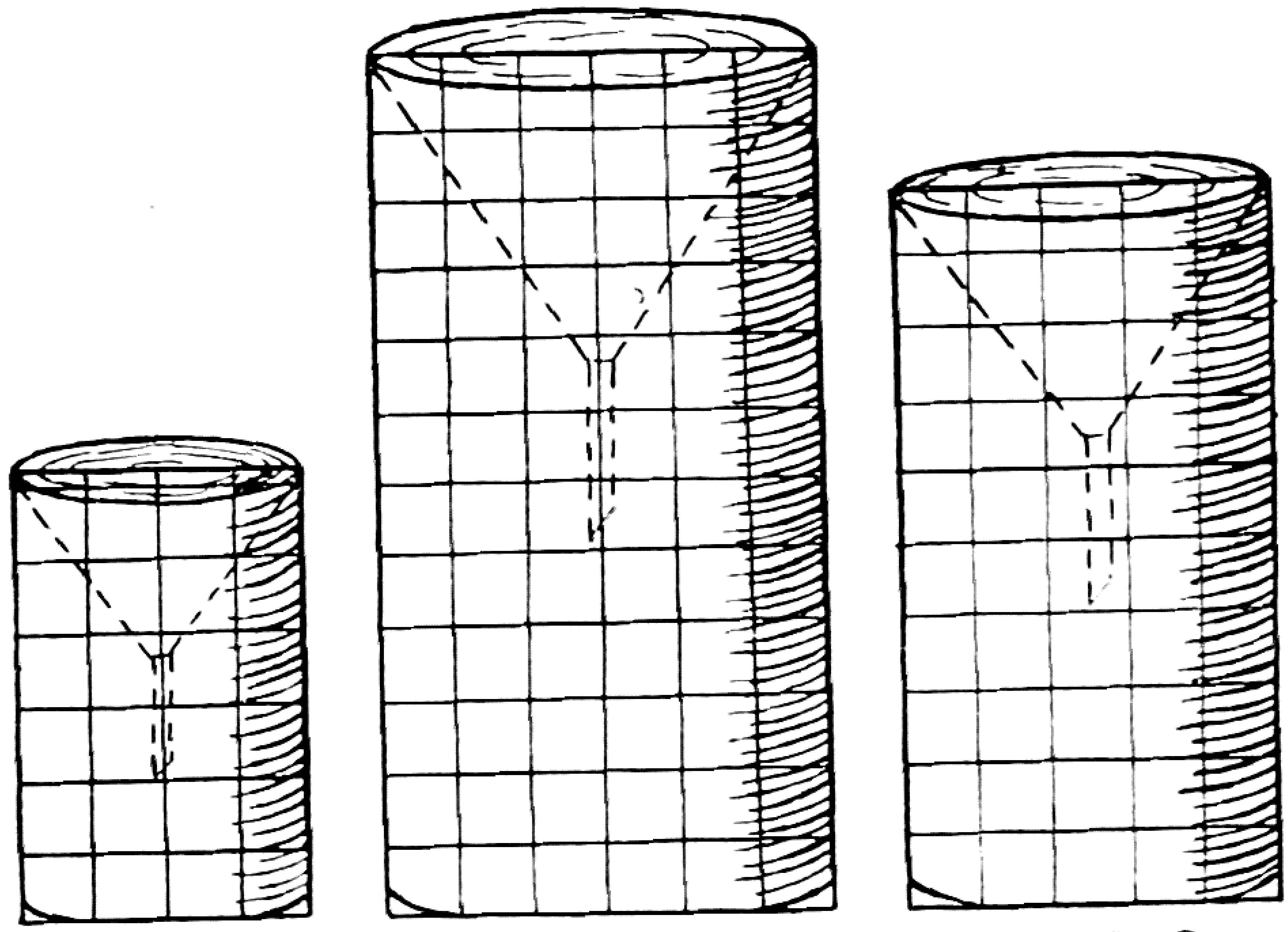


FIG. 36. EXAMPLE OF A BAD TYPE OF DIAGRAM

The representation of rainfall by 'picture diagrams' of rain-gauges, as above, appeared in certain publications for children's use some years ago. This diagram is intended to compare the average yearly rainfall of Bombay and Madras with that of London. It is to be condemned for the following reasons: (i) It does not follow the correct method used by meteorologists to represent rainfall graphically. (ii) Rainfall is measured vertically—*i.e.*, in one direction. The figures 25", 72", 50", stand for height (or depth) of rain-water. In the diagram a measurement of ***height*** is represented by an ***area***. (iii) Because they indicate solid objects these diagrams suggest measurement in three dimensions—*i.e.*, that *volume* of rain-water is represented! (iv) From the diagrams children are likely to conclude that rain-gauges vary widely in size according to the amount of rain they have to measure in the year. (Standard patterns used by meteorologists generally measure 5" or 8" in diameter.) Moreover, not one of the 'rain-gauges' shown above is correctly proportioned.

interpret readily because they have made similar ones themselves.

The most faulty diagram of this kind which the writer has seen represented the amounts of rainfall in different places by a series of rain-gauges in varying sizes (see Fig. 36).

Fig. 37 shows a type of diagram easily made by children aged about eleven to twelve. (The wool trade of the United Kingdom was being studied, following a visit to

THE WOOL TRADE OF THE UNITED KINGDOM, MOST OF WHICH GOES THROUGH THE PORT OF LONDON[1]

I. IMPORTS	
Australia	£19,000,000
New Zealand	14,000,000
South Africa	12,000,000
Argentina	4,000,000
All other countries	11,000,000
Total . . .	£60,000,000
II. USED IN BRITAIN	£33,000,000
III. RE-EXPORTS TO	
Germany	£9,000,000
France	9,000,000
Belgium	4,000,000
U.S.A.	3,000,000
All other countries	2,000,000
Total . . .	£27,000,000

the Port of London, where wool bales had been seen in transit.) The statistics are no longer up to date, but as an example, the diagram serves its purpose. Nowadays some teachers would prefer isotypes to simple squares.

School-work in geography with children older than about ten years should include much making of diagrams for the following reasons:

(i) To show a fact diagrammatically is often easier for a child than to express it in words.

(ii) The construction of a diagram necessitates *using* the figures or other facts as distinct from passing quickly over

[1] Adapted from figures given in *The Times* "Port of London" supplement, October 1928. The tables are based on the figures for 1927.

them or learning them by rote. This means that they are likely to be remembered clearly, yet without any conscious learning.

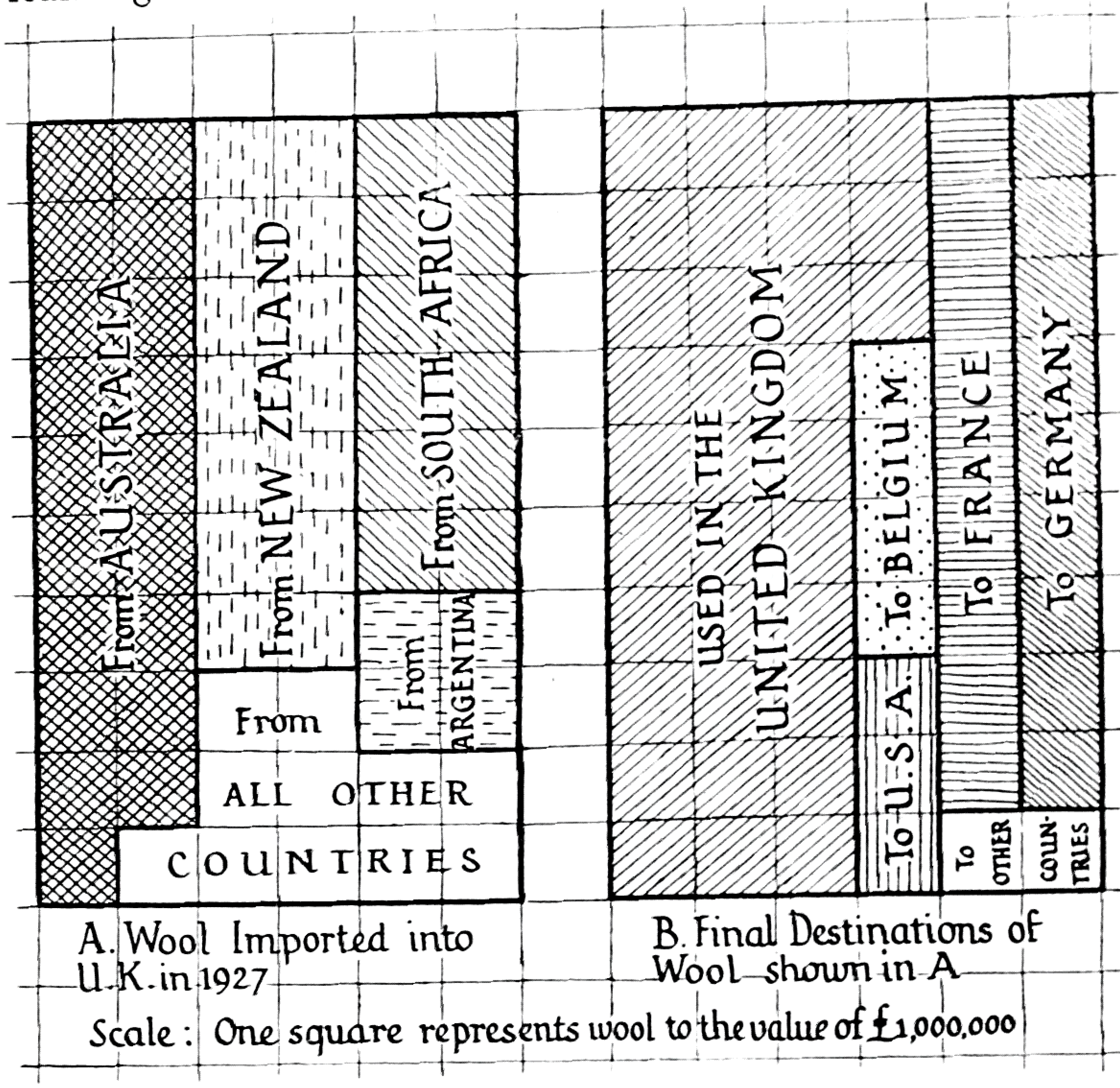


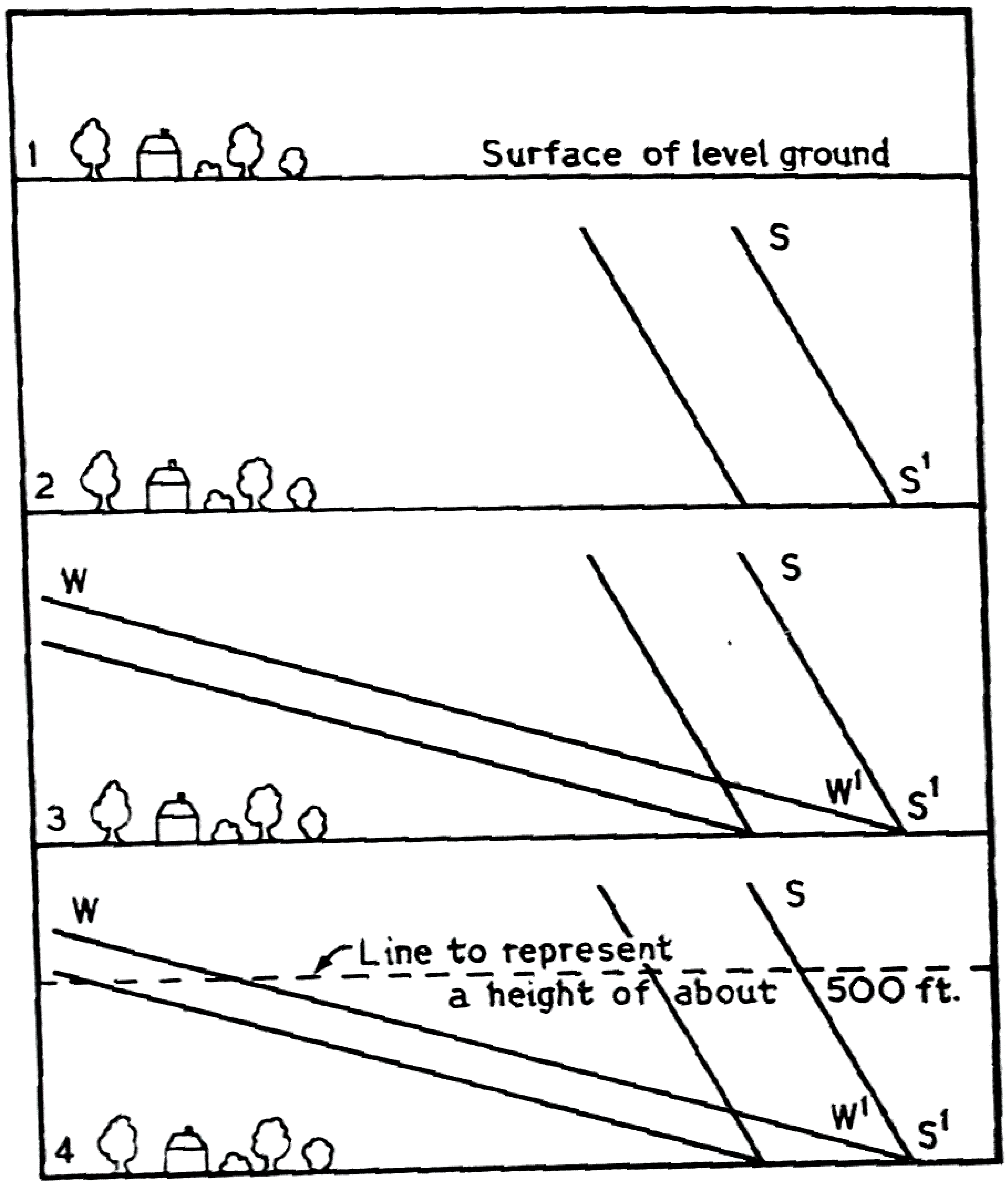
FIG. 37. EXAMPLE OF A TYPE OF DIAGRAM VERY EASILY MADE BY CHILDREN AGED ABOUT ELEVEN IF THEY USE SQUARED PAPER

In this case the total of sixty squares makes a neat rectangle, which is not always possible. (See table on p. 184.)

(iii) The children come to appreciate the value of exactness.

(iv) They gain experience in using approximations and the more suitable kinds of symbolism.

(v) An activity of this kind gives opportunity for practical



SS', a shaft of sun's rays at midday in midsummer.
WW', a shaft of sun's rays, equal in width to that marked SS', at midday in midwinter.

FIG. 38. DIAGRAM TO EXPLAIN WHY SUMMER IS WARMER THAN WINTER (SO FAR AS THIS CAN BE UNDERSTOOD BY CHILDREN AGED ABOUT TEN)

Example of diagram constructed step by step on the blackboard, largely by the children as they worked out the explanation. The teacher helped with suggestions when necessary. The shaft of sunshine reaching the same area (say, a tennis-court) is shown for midday in summer and in winter.

(*a*) Step 3 shows how the more slanting shaft of rays in winter is much narrower than the steeper one in summer.

(*b*) Step 4 shows how the more slanting rays of winter have to travel farther than the summer rays in passing through a given thickness of air, thereby losing more heat than the summer rays to dust and moisture in the lower atmosphere.

(*c*) The children realized the fact that the diagram fails to show a third reason—that the sun is in the sky for a much shorter time in midwinter than in midsummer.

Note. The sun itself should never be shown in diagrams of this kind. If it is drawn as a small circle 'in the sky' unnecessary difficulties arise. The fact that sunshine falls in lines can be made clear—*e.g.*, by noticing the sunlight entering a darkened room through holes in a blind.

work by every individual. The need for this is felt particularly in the large classes of primary schools, where children often have to 'sit and listen' too much.

In short, by constructing diagrams a child can make geographical facts clear and intelligible (*i.e.*, can *illustrate* them) to himself and by himself, while the experience so gained prepares him to use other diagrams intelligently.

The more complicated diagrams—those that depict processes—for example, of erosion and deposition—or illustrate explanations—for example, of geological structure, the seasons, etc.—are best worked out on the blackboard by teacher and class together, not presented to the class in their finished form (see Fig. 38).

The Use of Models

For many geographical subjects neither pictures nor diagrams are entirely satisfactory, and some form of illustration in three dimensions is desirable. Some important aspects concerning geographical models in school-work are discussed in Chapter XIV, pp. 323–325. These have to do with children's creative work, and are more appropriately considered in connexion with handwork in relation to geography. Therefore the discussions of models in this chapter will be limited more closely to their use as apparatus for demonstration by the teacher.

Most models could be classified into two groups: (*a*) those which attempt to show faithfully in every detail a subject that is inaccessible, but which could be seen, at least in part, if one had opportunity—*e.g.*, models of a coal-mine, a dockyard, irrigation-works, etc.—the dioramas at the Imperial Institute, South Kensington, London (remarkably realistic scenes typical of various parts of the Dominions); (*b*) those which are essentially symbolic—one might almost say 'diagrammatic'—*e.g.*, models of the solar system, of the formation of a spring, of the geological structure of a region (*e.g.*, those at the Geological Museum, Exhibition Road, South Kensington, London).

Generally speaking, models of the first kind are not to be considered as a means of classroom demonstration, since no ordinary teacher has the time, skill, and apparatus wherewith to construct them. Full use should be made of museums where they exist—*e.g.*, the Imperial Institute, South Kensington. Otherwise this type of model should be produced by creative work on the children's part (see Chapter XIV). The second type is more usually that which the teacher has to provide, often on the spur of the moment. Some facts about the use of models of this kind are best indicated by an example.

A class of boys was once shown an orrery, a remarkable instrument which represents the solar system, with each planet moving in its respective orbit correctly in relation to the others and to the sun. A certain amount of the mechanism was set working in front of the class, and facts about the orbits of earth, moon, etc., were discussed. At the close of the lesson the boys were asked which they thought the most wonderful, the solar system or the instrument which represented it, and a large proportion voted for the latter! It was to be expected that the cogs, cranks, etc., of the machine would have a great attraction for them. Actually their interest in a present and concrete wonder was so great that it prevented them from considering the remoter and infinitely greater wonder for which it stood.

This is, of course, an extreme example, but it makes clear an important point. A model of this kind should be sufficiently simple not to defeat its purpose by becoming a thing of interest in itself. For this reason a rough-and-ready use of any common objects to hand is often more effective. The teacher must not forget that children are always ready to pretend. It is quite possible to show the movement of the earth round the sun by means of objects held in the hand, perhaps by enlisting the help of members of the class. The children can readily 'imagine away' the child who holds the globe (or the ball), and 'see' the earth moving freely in space. This is partly because even the dullest knows that this is not the normal occupation of the child, whereas there is no

other purpose for the wire rod of the orrery than to support and move the 'earth.'

A surprising amount can be done with the help of familiar materials. For example, using a ruler and three fingers of one hand, it is possible to show how an elephant carries a baulk of teak-wood (gripping it in the middle with the help of tusks and trunk); by means of a pile of books and a ruler, how the elephant stacks the teak, raising one end of the baulk till it lodges on the top of the pile, then lifting the other end and pushing the whole baulk forward longitudinally in a horizontal direction, till it lies neatly in its place. Members of a class who had previously seen one or two pictures of elephants in the teak-yards declared after watching this simple demonstration that they 'saw,' not the hand, ruler, etc., but the elephant and the timber. They then asked to see the pictures again, and studied them with fuller understanding. The possibilities afforded by books in various positions, a cloth or rug, etc., are familiar to students of geology. As soon as a teacher of junior-school children feels the need to use materials unfamiliar to the class he should suspect that the model he intends to make is probably one that the children should construct for themselves. The reasons for this are made clearer in Chapter XIV, p. 323 *et seq*.

APPARATUS AND MATERIAL FOR ILLUSTRATION

Note on the Use of Air Photographs

Photographs from the air are often of great value, partly because they show a given feature in its setting, in a way that no photograph from the ground can do. For many geographical subjects photographs from the air help the interpretation of photographs from the ground, and *vice versa*. As suggested by Professor Linton, children should probably be prepared for the reading of air photographs by studying air photographs of their own neighbourhood. He also suggests that, for children of primary-school age, air photographs should be large-scale obliques, taken from a low altitude.

See Linton, D. L.: "The Use of Air Photographs in the Teaching

of Geography," in *Geography* (December 1946); and "Interpretation of Air Photographs," in *Geography* (September 1946).

Air photographs, oblique and vertical, of many parts of the British Isles, limited areas of the British Empire, and several other countries may be obtained from the Library, Aerofilms, Ltd, 29 Old Bond Street, London, W.1.

R.A.F. Photographs, chiefly vertical, may be obtained through the Geographical Association.

Sources of Pictures

Photographs published in *The Times* and other newspapers are often useful. Prints may be purchased from *The Times* Photographic Dept.

The National Geographic Magazine (published monthly by the National Geographic Society, Washington, D.C., U.S.A.).

The Geographical Magazine.

Pictorial Education.

Geography Picture Summaries (Harrap).

Cons, G. J.: *Regions of the World in Pictures* (University of London Press).

Pilot Wall Sheets (Pilot Press).

Visual Aids

For information about Visual Aids see:

The following articles in *The Journal of Education*, April 1947:
- Petter, H. M.: "Visual Education."
- Patterson, —.: "The Future of Visual Aids."
- Coppen, H.: "The Film Strip as an Educational Tool."

The Factual Film (a survey sponsored by the Dartington Hall Trustees): Chapter III, "The Use of the Film in Education," and the Bibliography on pp. 241–242 (Oxford University Press, 1947).

The Film in National Life (Report of an Inquiry by the Commission on Educational and Cultural Films), Chapter V (Allen and Unwin, 1932).

The Film in the Classroom (Report published by the Glasgow Education Committee, 1933).

Fairgrieve, J.: "The Use of Films in Teaching," in *Geography* (June 1932).

Geography Teaching and Travel Films, Subject List, published by the British Film Institute (4 Great Russell Street, London, W.1), who also provide information on other matters concerning films.

List of Epidiascopes, and Fairgrieve, J.: *List of Recommended Silent 16 mm. Films* (The Geographical Association, Manchester).

The British Film Institute, in collaboration with the Geographical Association: *Geography Teaching Films* (The British Film Institute, 1948).

Important Sources of Visual Material for the Teaching of Geography (The Geographical Association, 1948).

HARRIS, B. M. B., and MEREDITH, G. P.: *Material for Visual Education* (Daily Mail School Aid Dept., 1947).

DALE, E.: *Audio Visual Methods in Teaching* (Harrap, 1947).

CONS, G. J.: *Geography and Visual Education* (The Royal Geographical Society, 1947).

Visual Aids. *Films and Filmstrips*: Part V, For Primary Schools, and Part II, Geography for Secondary Schools (Educational Foundation for Visual Aids, 1949).

TRUBY, J., and DOREY, L. W.: *Visual Aid Year Book* (Daily Mail School Aid Department)

"Sources of Visual Aids on the Commonwealth." *Geography*, April 1954.

LITERATURE

For literature of geographical interest see:

UNIVERSITY OF LONDON INSTITUTE OF EDUCATION STANDING SUB-COMMITTEE IN GEOGRAPHY: *Handbook for Geography Teachers* (ed. by G. J. CONS)(Methuen, 1955).

ANDERSON, M. S.: *Splendour of Earth: an Anthology of Travel* (Philip, 1954).

FORSAITH, D. M.: *Handbook for Geography Teachers*, pp. 272–299: "Geography in Literature" (Methuen, 1932).

WHARTON, D.: *A List of Novels and Literary Works of Geographic Interest* (The Geographical Association, Manchester; out of print).

The School Library Review, Geography number, summer term, 1941: several articles, including HENRY, G.: "A List of Geographical Novels and Travel."

STATISTICS

For statistics from which simple diagrams of the kind described on pp. 184–187 can be constructed the most comprehensive source-book, giving particulars of area, population, production, and trade of all countries, is *The Statesman's Year-book* (published annually by Macmillan).

CHAPTER VIII

CLIMATE—PART I

The Place of Climate in Geographical Study

No other aspect of environment plays a more important part than climate in determining (*a*) the conditions of daily life in a given region and (*b*) the nature and amount of the work that must or can be done by its inhabitants. In certain directions science has modified some of the more obvious limitations imposed by climate, but only within narrow fields, and often by using indirect or remoter results of climate to combat the more immediate—*e.g.*, by irrigating a desert with water that fell as rain or snow on distant mountains. Man can scarcely be said to carry out a 'conquest of Nature.' His greatest achievements in improving his own lot are brought about by working harmoniously *with* Nature—*i.e.*, by discovering and turning to account what Nature has to offer. This being so, climate will probably always be of paramount importance as a factor influencing the activities of mankind in all parts of the world, and the study of climate will therefore remain one of the chief concerns of the geographer.

A great many of the characteristics that make other lands different from our own are due to differences of climate. Natural vegetation, crops, the form of the houses, the very appearance of the sky and the landscape, the 'feel' of the air, are all closely related to climatic conditions. The points that bring facts about climate home with convincing reality are often not the facts themselves, but the results they produce. To take two examples:

(i) English children can gather many of the essentials concerning the climate of Central Australia on learning that when torrential rain fell in 1930 not only did the river Finke

flow for the first time in seven years, but many children at Alice Springs saw the countryside carpeted with flowers for the first time in their lives.

(ii) The average person is less impressed by the mere knowledge that the air in a particular equatorial region is very damp (or even by the figure giving the actual humidity) than by the fact that paper and books become limp and covered with mildew, and that it is often necessary to brush the mildew from one's boots before putting them on. To children and to most adults climate is a reality chiefly in so far as it has a noticeable effect on everyday life.

It is, of course, impossible to describe a foreign land and the conditions of life within it without implying a great deal about climate, even though climatic conditions may not be referred to in so many words. A certain proportion of a child's ideas about the climate of a country is gained in this way—*i.e.*, in relation to other points of interest, not as 'the climate' considered for its own sake. Climatology as a separate subject is important in university work, for the more advanced student of geography not only recognizes the various branches of his subject, but also feels the need to pursue each one separately. School-work as a general rule should be focused more continuously on human geography, the necessary study of climate fitting into this or arising out of it, but never becoming detached from it. (This does not, of course, mean that there should never be occasions when a whole lesson or more is given up to the consideration of some problem of climate when the occasion arises, especially with the older children.)

Description before Explanation

To learn geography is to learn about climates, partly through learning facts which reflect climate. But the impressions which a junior-school child is continuously collecting, about climates as about anything else, are inevitably unsystematized. He is interested in any point that holds reality for him, but he is not necessarily ready to see that

point as the result or cause of several others. The method of approach natural to a child is to collect facts first, and to systematize them or to reason about them afterwards. A golden rule for the teachers in the junior school should be: Give the children the facts—*i.e.*, show them the climate of the country as a reality—and leave the explanations as to causes till the time when *the children ask, "Why?"* Even then the full explanation is generally more than the children want, and certainly often more than they can grasp. In any case, complete explanations, even of such a matter as the causes of rain, cannot be given until the children possess or can acquire some knowledge of elementary physics. Nevertheless it is usually possible to give an inquiring child of ten to eleven an indication of the general lines along which an explanation he demands would go, though he cannot as yet understand it in detail.

Young teachers who have themselves perhaps only recently grasped the full chain of 'cause and effect' behind the *régime* of, say, Mediterranean or monsoon climate are sometimes anxious to begin at what they perceive to be the fundamental fact—position in relation to latitude and to land- and sea-masses, with resulting seasonal changes of wind. Thus, the unfortunate children, instead of being allowed to plunge directly into matters which interest *them* most, concerning, for example, "what it is like" to live in Greece or Bengal, are bored and puzzled by a series of introductory steps which, to the children, have little connexion with the things they want to know, and which are, in many cases, outside their capacity to understand. The error on the teacher's part is often due to the fact that the lesson is prepared with the help of a text-book wherein the climate of the country in question is approached through a series of carefully ordered paragraphs enumerating all the contributory factors. The result is a lesson which attempts to simplify the text-book facts, and is likely to end by making a travesty of them. It may proceed by steps similar to the following: (*a*) The children describe the position of Greece; (*b*) the children suggest "what winds will blow in Greece";

(*c*) the children are asked to say "what they think the climate of Greece will be like."

In any case, the misuse of the future tense ('will be') is sufficient to indicate the fallacy of such a line of approach with children. It implies guessing at facts which can be stated with honesty only by one who knows them to *exist*. With certain corrections of this kind the line of reasoning suggested would perhaps be suitable for students or older children who have a background of knowledge from which to work—in this case an understanding of the Mediterranean climate and a knowledge of its distribution. Children younger than twelve years should not as a rule be called upon to make suggestions (or guesses) of this kind, if only for the reason that it is very bad training for them to imply that they are able to do so. This is one of the cases in which 'teaching children to think' may easily become 'training them to jump to conclusions.'

Geography should be first of all descriptive. Yet it seems that many children leave school with a 'knowledge' of climate that includes very little description, but consists chiefly of semi-explanatory text-book 'tags.' When a class of students fresh from school is asked to describe the Mediterranean climate the usual answer received from those who can give one is: "Hot, dry summers; warm, wet winters" (often delivered rapidly and in a monotonous tone, as if learned parrot-fashion!). Some students can explain that this seasonal change is brought about by the movement of what they call 'wind-belts,' but comparatively few are able to give any details which show a conception of the Mediterranean climate as an actuality. Except for those who have experienced it, these students often know nothing, for example, of the sunshine, plentiful even in winter in Mediterranean lands, and they have surprisingly little knowledge of the characteristics which most clearly reflect the climate —*e.g.*, the glories of the Mediterranean spring; the parched dustiness of the summer; the importance of winter, in addition to summer, as a growing season for crops, etc.

School geography has not contributed its proper quota to

a child's education if before he leaves school he has had no opportunity to learn those intimate details of climate and weather that play a part in human life in Palestine, Greece, and other lands about whose people the child has much to learn in other connexions. An educated person should be able to 'imagine accurately' the cycle of the seasons in these lands as an essential background to their literature and history. No amount of mere *explanation* can take the place of this. Moreover, the rule that to describe is more important than to explain holds good also in connexion with the more utilitarian aims in teaching geography. Men whose livelihood depends on trade, business, travel, agriculture, or almost any form of production in foreign lands need to know actualities about climates, not theories to account for them. There is more practical value in the possession of detailed knowledge concerning the *characteristics* and the *distribution* of, for example, the tropical monsoon climate than in the mere ability to explain it by reference to pressure conditions, etc.

But the general rule 'description before explanation' in school-work about climate holds good not only on account of the more obvious interests on the part of both children and adults, but by reason of a broader truth concerning geography itself—that it is response rather than the cause with which the geographer is concerned.

Response rather than Cause

Generally speaking, as soon as the study of any one aspect is pursued for its own sake, out of any relation to man himself, it may be regarded as lying outside the field of geography proper, but within that of the related subject. For example, man's activities are often to a greater or lesser extent determined by the character of the plant-covering found within a given region. Therefore the geographer studies those aspects of the earth's vegetation which concern mankind—for example, the nature and distribution of different types of forest, or even of particular trees or other plants. As long

as man's activities are, even remotely, in the background the study may be geography, but as soon as the plants are studied for their own sake the subject is botany. Similarly, geographers must study climate, in so far as man's well-being and activities are conditioned by it; but as soon as the climate is pursued for its own sake the subject is climatology.

It is, of course, of great value for the student of geography to pursue each branch of his subject some distance into the adjoining field. Often he cannot gain full understanding without doing so. But it should not be a usual procedure to start in an adjoining field—for example, of climatology or botany—in order to enter that of geography, if only because the facts a geographer needs to know within other fields are determined by what he finds necessary for work in his own. A university student who is aware of this may sometimes plunge into the pursuit of a topic, not at its origin in geography, but at some distance away, perhaps in the field of botany or of climatology. But if a child at school is to attack a given topic for himself, perceiving the problem and feeling the need for its solution, he must begin at the point that reveals the problem *to him* as a topic that requires to be pursued. In any case, the child's perception of the subjects—geography, climatology, botany, etc.—and of their inter-relation is not yet clear enough to enable him to see where he is and whither he is going if he does not start from familiar ground and with a knowledge of the direction in which he is to travel.

In school geography the centre of the field is concerned with 'place' and 'people.' No study of these can ignore the *influence* of climate, but the *causes* of climates lie within the field of climatology. It is helpful, or even necessary, for a geographer to know these causes, but they lie towards the *end*, not the beginning, of the lines of study most suitable for children. The geographer, and the child who learns geography, is led to a study of climate because he has to study *response to* climate.

Before dealing further with the teaching of climate as such it seems advisable to attempt to make clear what is meant

by 'response to climatic conditions.' The range of subject-matter makes it impossible to do justice to it here, but a study of two examples may serve to illustrate the manner in which it should figure in school-work. Of the examples selected—one from human geography and one from economic geography—the first is treated in some detail in order to show the importance of detail in this type of study. On account of the deductions involved neither example should be considered representative of subject-matter suitable for children younger than about ten to eleven years, but for the same reason both exemplify the relating of cause to effect which offers valuable training in thought for children older than this. The examples are more fully treated than would be possible as a rule with children younger than about fourteen, but a selection of the points included could be worked out by children much younger than this, some by normally intelligent children of ten to eleven.

THE INFLUENCE OF CLIMATIC CONDITIONS

(i) Example from Human Geography

Since the subject "Homes in Many Lands" is a favourite in school geography it seems suitable to take as an example the homes constructed by a people who live close to nature.

The Dwellings of the Mimika Papuans[1]

The Papuans who live beside the Mimika river, in Dutch New Guinea, inhabit a region of dense equatorial rain-forest. Their houses are built together in small isolated villages, each of which is generally composed of a single 'street' alongside the river, often on a sand-bank or mud-flats. Each dwelling is rectangular in plan (about 9 ft. by 12 ft.), with the roof sloping downward as a rule to both back and front from a central ridge-pole. Except for the sand, carried from the

[1] Described by A. F. R. Wollaston in *Pygmies and Papuans* (Murray, 1912; out of print).

nearest beach to cover the floor, the whole house is constructed entirely from vegetable materials. Light poles driven into the ground to make the framework are obtained from the midribs of the leaves of the sago-palm. (These midribs are straight, strong, and may be fifteen or more feet in length.) The cross-pieces and the roof pole are tied to the uprights by strands of rattan (*i.e.*, cane fibre ; *cf.* rattan canes used in school basketry). The walls are built of mats made from the leaves of the screw pine (*pandanus*), and the roof is covered with overlapping strips of a material called 'atap.' This is the name given to a kind of matting made by folding many leaves of the nipa-palm over and fixing them to a straight stick. The pieces of 'atap,' overlapping one another like enormous tiles, are fixed to the roof by strands of rattan. The whole is quickly set up and quickly taken to pieces.

Many children would raise the question as to 'why' in connexion with several of the points mentioned above. A little investigation reveals the fact that, directly or indirectly, practically every one of the details given reflects the climate of the region.

For convenience the characteristics of the dwelling may be classified under three headings: structure and form, materials, locality.

(i) **Structure and Form.** The superficial form of the dwelling—rectangular, with a roof sloping in two directions—is comparable to that of many houses in other regions where the climate is rainy. Like ourselves, the Papuan gives his house a roof that will throw off the rain. The roof, the part which receives the greatest care, most clearly reflects the purpose of the Papuan dwelling.

> When there is no lack of 'atap,' and the pieces can be laid on the roof very closely together, it forms a most efficient thatch which keeps the house tolerably *cool in the hot weather*, and which is *impervious to the heaviest downfall of rain.*[1]

The rectangular plan, considered with the flimsiness of its materials and construction, suggests that this dwelling

[1] Wollaston, *op. cit.*, p. 60. The italics are mine.—O. G.

could not be used in a region of strong winds. It might be contrasted with the *circular yurt* of the Khirgiz, which, though made of materials almost equally slight, survives the gales that sweep across the Asiatic steppe.

In a region that is never really cold (though a damp chilliness may be felt at night) walls may be adequate when constructed merely of palm-leaf matting. The fact that they must be far from draught-proof is no doubt an advantage.

At least three conditions of equatorial climate are thus reflected in the form and structure of the house—great heat, torrential rains, and relative absence of winds.

(ii) **Materials.** With one exception all the materials are obtained from the rank-growing vegetation of the equatorial swamp-forest. The very size and substance of the leaf-stalk and palm-frond could be produced only in a land where *optimum* conditions for plant-growth prevail. Drought or a sharp change of temperature will check plant-growth. Though, of course, not limited to the equatorial rain-forest, luxuriance of vegetation—the midrib of *one leaf* measuring many feet in length—is certainly typical of that region. The plant materials therefore reflect the equatorial climate, with its constant heat and moisture, and the relative absence of wide variations of a kind unfavourable to plant life—*e.g.*, drought and frost.

These materials are, however, not quite the only ones that exist in the locality. Stone, of course, is absent, but timber is present everywhere. Reasons which may help to explain why the latter is not used will be suggested later. Mud, of which houses are made in many parts of the world, may be plentiful, but even if local mud were suitable for building, which one would imagine is unlikely, it could never be dried after erection, and it could not withstand the equatorial rains. (Assuming that it might survive a short time, it would in that case probably develop a sprouting mass of vegetation *plus* the animal life that goes with it!) Houses with walls made entirely of mud are found in lands where rain is slight, or where the rainy periods are short-lived (*e.g.*, Egypt and Northern Nigeria).

The sand which is spread over the floor provides, in the circumstances, a suitable 'flooring' material, since it dries off very quickly when the water subsides after a flood. The significance of this point is best considered later.

(iii) **Locality.** The locality of the dwelling by the riverside is determined by several facts, at least two of which indirectly reflect the climatic conditions.

(*a*) The river is the chief or only highway (navigated in dug-out canoes), because the forests and swamps are practically impenetrable. Climate is indirectly responsible for this, since the profusion of plant-growth and the existence of vast swamps are both direct results of climate.

(*b*) Also for the above reason open spaces relatively clear of vegetation are at a premium. They are probably only to be found where the river leaves sand- or mud-banks exposed, either through changing its course or through losing volume. To clear a site entails enormous labour.

A disadvantage associated with the position of the village, and one which not only reflects climate, but helps to explain several characteristics of the houses, is the constant danger from floods. Periodically unusually heavy rains cause the river to rise far above its normal level. The manner in which the dwellings lend themselves to such an occurrence is best described in the words of an eyewitness:[1]

> It had been raining steadily for some days, and the river was fairly full, but about sunset on the 18th (August) the rain really began to come down solidly, as it does in the tropics. About midnight a terrific storm began, which continued with almost incessant thunder and lightning until dawn, but long before this the river had risen several feet, and was already threatening the village. As soon as the water began to rise the natives appeared at the edge of the river with blazing torches, while canoes were baled out and brought nearer to the shore. When the flood, rising visibly by that time, reached the lowest house a most extraordinary bedlam broke loose, and it sounded as if all the people in the village were being drowned. The men all shouted at once, the women screamed,

[1] Wollaston, *op. cit.*, pp. 190–191.

> and the dogs whined and howled. By the light of the flashes of lightning we could see them scurrying hither and thither, bundling all their belongings into the canoes and trying to save the roofs and matting walls of their huts by throwing them among the branches of the trees at the back of the village. In a very short time all the houses had been swamped, and the people were in their canoes, about twenty in all, moored to the branches of the trees along the edge of the jungle, where they kept up an incessant turmoil until daylight. . . . Soon after daybreak the ground on which the village had been began to appear above the falling water, and it was seen that not one stick of the huts was standing. But the natives were anxious to get out of their canoes, and by midday half the huts in the village were rebuilt with the fragments they had crammed into the canoes or put up in the trees. During the next two or three days they brought back quantities of housing materials which had been carried for miles down the river, and very soon the village resumed its normal appearance.
>
> On two subsequent occasions in the following month the village was completely swept away by floods, and it was a matter of surprise to us that they did not adopt the custom of their neighbours . . . and build their houses on piles. The third great flood swept away the sand-bank on which the village stood, and they were compelled to rebuild their houses on the top of a high bank further down the river. Such a place as that necessitated cutting down a number of big trees.

It is clear from the above that the huts constructed by the Mimika Papuans from palm-leaf mats have many advantages. Assuming that for some reason unknown the erection of dwellings on piles is impossible in this neighbourhood, there could probably be no more suitable housing material obtained locally than the palm-leaf matting to meet an emergency of the kind described. The huts are quickly taken to pieces, the mats and 'atap' are light to throw up into the trees or pack into canoes, and the dwelling is quickly set up again when the floods subside. If a heavier material—*e.g.*, timber—failed to resist the flood it would more probably be lost, not only because timber could not so easily be thrown up into the trees or kept with the canoes, but also because a

wooden house is less quickly dismantled. Moreover, since timber can be felled (by means of stone axes) only with enormous labour and expenditure of time, its loss by flood would be immeasurably greater than that of the palm-leaf matting, which is quickly made.

It is easy to understand one reason why his canoe is the most treasured possession of a Mimika Papuan, for it offers him and his family their only hope of survival with their household goods in time of high floods. (Elsewhere in New Guinea houses are built on piles. It may be that the force of the Mimika river in this district—capable of removing a whole sand-bank in a single flood—is too strong to allow the Mimika Papuans to put their trust in piles, even if they could erect them!) The incident quoted suggests that a canoe is a necessary adjunct to a house—for a climatic reason.

In short, the Papuan dwelling is adapted, though imperfectly, to meet the emergency of floods, which are inevitable in the places otherwise most convenient for building houses. The floods vary in extent, from those which on departing merely leave a damp floor to those which necessitate demolishing the whole house. They are, of course, the direct result of certain characteristics of the rainfall *régime*. Heavy rains fall practically every day in the year, but the amount is variable. A fall of six inches was recorded more than once in a single night in March, a comparatively dry month. The rivers, generally more or less full, are liable to sudden rises, and in the wettest season floods of the magnitude of that described are to be expected. The behaviour of the people before the water rose very far showed that they knew what was to come.

In constructing his house the Papuan has, among other things, to make provision for (*a*) heavy daily rains, (*b*) frequent heavier rains producing a moderate rise of the river, (*c*) occasional excessively heavy rains producing violent floods.

This adaptation of the house to meet an occasional variation from average conditions should be noted, since it provides an example of a truth that has some importance in

studies of this kind. A peculiarity common to the dwellings in a given area is sometimes a response to what might be called a 'characteristic abnormality' in the climatic conditions. (*Cf.* those houses in the south of France which seek any shelter from the cold *mistral*, and which show no doors or windows towards the north, whence the *mistral* blows; this in a region where winters have a reputation for genial warmth, and where the heat of summer is sufficient to suggest that *sunward* exposure should be avoided.)

Although this example (pp. 198–204) is not expressed in the manner and language of children, it follows the children's method of attack—*i.e.*, the house is first described, and *then* the reasons for its characteristics are investigated. The reverse method—to begin with the causes or reasons and to "lead up to" the dwellings as the response with the statement "Therefore the houses are made of palm-leaf mats, etc."—is generally a faulty line of development with children. At its worst it produces questions like "So how do you think their houses are made?" The most thoughtful answer to this might be 'on piles,' which serves to illustrate the weakness of such a method of approach.

Note. Climate is only one of the factors which influence the life of any people. Therefore the above account is inevitably one-sided, since it must ignore important points that would figure in a full geographical study. For example, in addition to the one reason given a Mimika Papuan treasures his canoe for two other reasons, which are not related to the house, and which therefore must be omitted, though they are probably more important than the reason included. Firstly, without a canoe the Mimika Papuan and his family would starve. Secondly, a canoe is made only with the expenditure of much time and labour on the part of several men (whose only tools are—or were—sharpened shells and stones).

Attention is drawn to this in order to make it clear that the facts as given here are in several cases incomplete or unbalanced, and therefore should not be used as they stand outside their special application at the moment.

(ii) Example from Economic Geography

First steps in economic geography are often made by children through a study of the production of familiar, everyday things, and one piece of work suitable for children of about ten years and older is the investigation of what might be called "The Geography of the Greengrocer's Shop" (see pp. 291–292).

A class of children working in groups can carry out observations at a number of greengrocers' shops in the school neighbourhood, noting the kinds of fruits and vegetables for sale from month to month, and finding out the countries from which they have come. By examining labels and boxes, the wrappings of fruits, and by making other inquiries children can carry out what is for them research. The facts discovered lead to further investigations in books and elsewhere concerning the places where particular fruits and vegetables are grown, the conditions necessary for their production, the work entailed, etc. If this observational study is maintained at intervals or continuously for a full twelve months many facts of interest related to climate are brought to light. The following list gives examples of the facts that may be discovered and which lead to ideas about climate and to a study of climatic types.

(i) At any time in the year there are gathered together within the four walls of the greengrocer's shop products that represent a wide variety of climatic regions. Assuming that the shop counter (or even a hawker's barrow) offers for sale home-grown apples, Spanish oranges, and Jamaica bananas, the products of three distinct climatic types are there assembled together. The shop may also show grapefruit from Palestine or South Africa, lemons from Sicily, dates from Tunis and the oases beyond, tomatoes or new potatoes from Jersey, onions from Egypt, etc. An English housewife may purchase at the same time the produce of many climatic regions: sub-equatorial—bananas; desert—dates; sub-tropical (wetter type)—grape-fruit; Mediterranean—oranges or lemons; cool temperate—apples, other

fruits, and many vegetables; temperate (milder type)—tomatoes, etc.

(ii) It is found that at different times of the year a given article comes from different places. Climatic differences, comparatively slight, but none the less significant, are responsible for the fact that from late winter onward new potatoes and other vegetables, as well as cut flowers, come to London in sequence from various parts of France and Spain, the Channel Islands, the Scilly Isles, Cornwall and Devon, the nearer Home Counties, East Anglia, etc. In London the seasons for cherries, strawberries, raspberries, and other fruits are prolonged, not only because the fruit is ready slightly earlier in some parts of Britain and later in others, but also because Continental countries that lie near enough to Britain to send perishable goods by special transport (France, Holland, etc.) can supply us with soft fruit before or after the time when the home-grown product is at its best. Climatic differences are mainly, but not entirely, responsible for placing earlier or later the time when fruit is ready for marketing.

(In this connexion it is necessary not to overlook such matters as soil conditions and, perhaps more important, the use of glass (including hand-lights) in Northern France and the Netherlands. Quantities of tomatoes are produced in glasshouses in England; and even in Kent at least one market-gardener brings strawberries to perfection at a very early date by cultivation under glass. These points must be kept in mind, but may be regarded as exceptions, to be explained by the possibility of obtaining very high prices for an unusual product in near-by markets—*e.g.*, London or Paris.)

(iii) The fact that a given country exports a particular fruit implies as a rule that the necessary climatic conditions prevail in at least a part of that country. The lands which export apples or oranges in each case possess certain climatic conditions which favour and lack certain conditions which prevent the production of the fruit in question in a form or state suitable for marketing. An investigation into the

climatic requirements of a few individual fruits leads to considerable knowledge of details concerning the climates of areas where the fruit will or will not grow. By a study of this kind a child can acquire a little of that elasticity and breadth of outlook which a widely travelled person gains through experience, and which leads him to associate particular crops or forms of cultivation, or even types of landscape, with certain peculiarities of climate.

(iv) There are some fruits that can be found in fruiterers' shops all the year round. In the case of oranges or apples this is largely because the climates of the countries in question bring the fruit to perfection at widely different periods. Certain conditions must be present or absent, but the climatic rhythm is by no means identical month by month in all the lands where a given fruit will flourish. Grapes and

TABLE SHOWING PERIODS OF THE YEAR IN WHICH CERTAIN FRUITS ARE MARKETED IN ENGLAND ACCORDING TO THEIR COUNTRY OF ORIGIN

FRUIT	COUNTRY OF ORIGIN [1]	TIME OF MARKETING IN ENGLAND [2]
APPLES	Home	July to April
	Canada	September to April
	Australia	March to July
	New Zealand	March to July
PEARS	Home	August to December
	Canada	September to December
	New Zealand	April to July
	South Africa	January to May
PLUMS	Home	July to October
	Canada	September to November
	South Africa	December to April
ORANGES	Spain	October to March
	Palestine	November to April
	South Africa	June to November

[1] The list is by no means complete in the case of any fruit.

[2] Details collected in the first instance by observation, but checked and completed, so far as they go, by reference to information kindly supplied by the Empire Marketing Board.

oranges both grow well in a Mediterranean climate, but grapes flourish also in Northern France and in Germany, and vast quantities of oranges are grown in Florida, in each case lands whose climate differs in several respects from the Mediterranean type.

Of great importance is the fact that the time of summer and winter is reversed in the Southern Hemisphere, so that the fruit is ready there just when that of the Northern Hemisphere fails. That he eats an Australian apple in April should be as significant to a child as the fact that cricket is played in Australia in December.

This and other differences of climate are reflected in the list given on p. 207. (Retarded ripening and storage must be allowed for in some cases.)

(v) The large number of areas which can produce a given fruit reflects the fact that regions with climatic conditions which are similar in at least some respects occur in many continents and on either side of the equator. (Allowance must be made for the selection or breeding of varieties to thrive under particular local conditions, but this can only extend areas of production within relatively narrow limits, by affording slightly greater resistance to frost, excessive moisture, drought, etc.)

If his study turns his attention in this direction a child comes to realize that lands which are far removed from one another on the surface of the earth may yet have similar climatic conditions, and that, though remote from one another, these lands often lie in positions which are in some respects comparable—*e.g.*, as to latitude, relation to land and sea, etc. This forms a kind of background knowledge, and will be developed later into a fuller acquaintance with the distribution of broad climatic regions.

Should the work develop in this direction two important warnings are necessary:

(*a*) Not more than a fraction of the lands which could produce a given fruit may actually do so (and some which grow considerable quantities do not export them to Britain). Therefore one cannot build up any satisfactory ideas as to

the distribution of a particular type of climate by discovering the distribution of a fruit that thrives in it! No teacher would wittingly make this mistake, but a child might vaguely conclude it if the teaching were not careful.

(*b*) Care must be taken to point out that though the conditions demanded by the fruit are similar, other conditions in the places where it grows may show great differences. The apple-producing regions of Tasmania, Canada, and Britain have certain characteristics of climate in common, but other characteristics which do not prevent the growing of apples (albeit special varieties may be necessary) are widely different—*e.g.*, the colder winters of the Eastern Canadian apple-producing lands.

(vi) A further study of the requirements of individual fruits brings out the importance of climatic facts that are often overlooked—*e.g.*, the amount of sunshine, the extent and frequency of frosts. The chief areas producing oranges, lemons, grapes, and peaches are lands of plentiful sunshine. Apples, pears, etc., demand a cooler climate, but can flourish only in lands that are relatively free from frosts once the early blossoming of the trees has been brought about by the first warmth of spring. This condition is found either in regions where the spring weather is more or less uniformly mild—*e.g.*, South-western England—or in lands where blossoming is retarded by prolonged cold until danger of frost is over—*e.g.*, in the Lakes region of Canada and the United States (where the slow melting of the ice on the lakes keeps temperatures low and delays the opening of the buds).

The importance of an occasional variation from the usual conditions is illustrated by the widespread destruction of orange-trees in Northern Florida through abnormal cold on the morning of January 1, 1894, and also by the fact that there are times when in East Anglia and in Central Europe some farmers light fires whose smoke safeguards their orchards from frost, if it occurs at a critical period.

The above points are intended merely to suggest the kind

of information about climate that may be gained through a study of this type. The student should notice the following facts:

(i) That a knowledge of climate is not sought for its own sake, but in relation to a more immediate interest on the child's part.

(ii) That the information about climate gained in this way ranges from facts of world significance to details of merely local importance.

(iii) That many of the points given have some qualifying facts to be considered with them. The conclusions about influence of climatic conditions cannot be drawn without caution and the recognition of exceptions. This gives the work a greater value educationally.

(iv) That once the facts about climate have appeared the teacher should take suitable measures to see that the child makes them his own, fixing them so far as he is able in his mind. This should be done if possible without interfering with the natural development of the work, and certainly without causing a check to the children's interest. It is profitable and generally pleasing to children to lead them to look back over their work and to make lists or summaries of facts learned within a given category—in this case of climatic facts learned incidentally. To make such a list, to reconsider some of the points, and to have it at hand for future reference is useful in many ways. The children will not only be much more likely to remember the facts, but will be encouraged to work as true students. Facts noted in one connexion are likely to appear in others, and should prove valuable and interesting in working out comparisons on future occasions.

The above examples serve to illustrate the fact that, although not studied for its own sake, a knowledge of climate is of fundamental importance in almost any geographical study. It is therefore necessary to consider more definitely the nature and amount of information about climate that can be gained by children in school-work and the manner in which it is best approached. One principle has already been

discussed—*that description should precede explanation.* It is important to know exactly what is meant by *description* in this connexion.

DESCRIPTION OF CLIMATE

Forms of Description

The climate of a place is generally described in books in one or more of three ways:

(i) By a brief classified statement which aims at giving a comprehensive synopsis. This method is characteristic of many school text-books. The following is an example:

> Throughout most of India the year can be divided into three seasons:
>
> (*a*) The Cool Season, from mid-December to the end of February.
> (*b*) The Hot Season, from March to the end of May.
> (*c*) The Wet Season, from June to mid-December.

(ii) By giving more precise details, generally with the help of statistics and graphs. For example:

THE CLIMATE OF BOMBAY (ALT. 37 FT.)[1]

—	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR
Temp.	75	75	78	82	85	82	80	79	79	81	79	76	79
Rainfall	0·1	0	0·1	0	0·7	20·6	27·3	16·0	11·8	2·4	0·4	0	79·4

The temperature is the mean temperature in degrees Fahrenheit, the rainfall the mean rainfall in inches.

(iii) By an account in which intimate details, themselves the result of experience (at first or second hand), make an appeal to the imagination, and give graphic reality to the bare facts. Though occasionally quoted in the fuller text-books, descriptions of this kind are chiefly to be found in the

[1] Figures obtained from W. G. Kendrew, *The Climates of the Continents* (Oxford University Press, third edition, 1937).

better books of travel. As an example the following account of the coming of the monsoon may serve, though it should be noted that this describes only the wet season, not more than one phase in the yearly climatic rhythm in a particular part of India.

> We were sitting in a rest-house somewhere on the west coast of India. The day had been unusually breathless, even after a spell of sultry weather when the sun shone from a cloudless sky, heavy with damp. . . .
>
> Next morning we awoke to a sky black with clouds. The rain was falling in torrents; cloud and rain were such as Coleridge saw in his vision of the tropics, save that "one black cloud" covered the heavens, and there was no moon at its edge. The monsoon had burst.
>
> 'Burst' is the only word. While we lay asleep the [weather[1]] had completely changed, not as in England for a day or two, . . . but for a solid three months, during which the rain would fall at the average rate of an inch a day. . . . Careful housewives were busy trimming their lamps, which, when placed under a stovepipe that ran through the middle of the wardrobe, served to keep the clothes approximately dry and free from mildew. You could not leave a book in the verandah overnight but it would come out in blotches, as though afflicted with some skin-disease. And for yourself, if you wished to keep well and to do your work, there was nothing for it but to put on your most ragged clothes and . . . submit to getting wet to the skin. . . .[2]
>
> The clouds driven across the open spaces of the sea never fail to discharge their precious burden on the coast.

In the interior of India it may be otherwise:

> For fifteen days or perhaps more one waits in expectation; after twenty days the expectation deepens into anxiety, and as the days go on and the sky is still clear, with a horrible relentless blue, anxiety becomes despair. There is no more depressing sight than that of the young rice, wilted and dying,

[1] 'Climate' in the original.

[2] For a few points of criticism concerning the use of this passage see p. 221.

> with the pitiful husks that refuse to fill in the baked fields where water should be standing inches deep. . . .
>
> It is difficult to convey in words the intensity of joy which the first thoroughly typical monsoon rain brings with it. As it falls, in an almost unbroken sheet, you watch it with greedy eyes and a prayer in your heart that it may go on for hours and hours. A *crescendo* in the music of its fall makes you feel at peace with the world; a *diminuendo* sends you out with the fear that the rain may be stopping before its time. . . . Never does the sun seem so ruthless, never is the dark-blue sky so 'hateful,' not even in May, when the fierce heat is doing its worst, as in those days when the clouds should be covering the sky and are not. . . . Only when the monsoon is thoroughly established is all anxiety ended and the young grain proceeds serenely on its way to the yellowing fields and the harvests of December.[1]

Each of the above three forms of description has its merits, and no one should be omitted in school-work, though circumstances must determine the manner in which they are combined. In the past the error has been to rely too much on Method (i) only. This accounts for the bald "warm, wet winters; hot, dry summers" as the 'tag' applied to Mediterranean climate by young students. The weaknesses of this method when used alone are (*a*) excessive generalization, (*b*) absence of precision (as to *how* 'wet,' *how* 'hot,' etc.), (*c*) absence of reality. Its value lies in the fact that it gives a handy synopsis, which by its very handiness may become too attractive.

Ideally it would be a good thing for the children to work out their own generalizations from a study of details. Time alone prevents this from being done always, but every child should receive the training afforded by work of this kind at least a few times during school years, if only for the reason that it helps him to realize how unsatisfactory these brief text-book statements may be. This work could not as a rule be carried out by children younger than eleven years, since it must be based on a study of statistics.

[1] "The Coming of the Monsoon," published in *The Times*, from a correspondent, July 1, 1927.

THE USE OF STATISTICS

Quantitive Statements

Provided that the figures have real meaning for the child, and that he knows enough about climatic statistics to regard them with caution, there is a great deal to be gained from a moderate use of them in school-work. It should be an exception for them to be consciously learned, but by the time a pupil is about fifteen years of age he should have acquired a useful 'working set' of figures representative of the major climatic types, gained through the familiarity that comes with frequent use. For example, a monthly average temperature somewhere near 80° F. at sea-level should leap to mind when describing the heat of an equatorial region; and the degree of warmth of the Mediterranean winters should be equally familiar, though more difficult to express in a single figure. A January average ranging between 45° F. and 55° F. for places at sea-level is representative.

Now figures of this kind hold meaning only if they can be related to definite experience—*i.e.*, of climatic and weather conditions in *our own country*, since the majority of children have not lived abroad much, if at all. The figures referred to above mean practically nothing unless they can be interpreted in the light of familiar experiences—*e.g.*, (*a*) the knowledge that 80° F. is approximately equivalent to the shade temperature at the hottest time of an unusually hot summer day, only registered on a few days in the year as a rule (yet this is the average of *day and night* temperatures for a month —in fact, for months on end—in many equatorial areas); or (*b*) that the 45°–55° F. January average in a Mediterranean locality is comparable to the average temperature for April and May in many parts of Britain. Used in this way and with sufficient caution, for a similar average does not necessarily imply similar daily temperatures (mean, maximum, or minimum), our experience of our own climate becomes a key to unlock the meaning of statistics describing other

climates, though, it must be admitted, a key which does not necessarily fit every lock. It must be borne in mind that physical well-being and bodily sensations or reactions at a given temperature depend to a considerable extent on other conditions, notably the relative humidity.

The Importance of Key Knowledge

The value of 'key knowledge' concerning the statistics of climate and weather of a child's home town is best indicated by another example. A generalized statement declares that Bombay has wet summers beginning in June. A detailed description helps the imagination to picture the wet season —to see and hear the rain falling and to visualize the results of it. The generalized statement needs statistics to make clear *how* wet it is, etc., and even the detailed description does not give exactness, to control imagination, until it expresses facts quantitively—*i.e.*, until it uses statistics— in this case to state that (at a given place on the west coast of India) "for a solid three months the rain would fall at the (average) rate of *an inch a day*."

This statement cannot be appreciated unless one knows what is meant by an 'inch of rain.' In the British Isles a person's conception of 'heavy rain' varies according to the locality with which he is most familiar, but, generally speaking, $\frac{1}{2}''$ of rain represents the amount that falls on a very wet day or in one heavy storm, and 1" in one day is a comparatively rare occurrence in most parts of England.

The list of monthly rainfall statistics (p. 211) gives the average rainfall for July in Bombay as 27·3 inches. As a mere figure this conveys little, but to a London child who knows that the average *yearly* rainfall in London is about 25 inches it conveys a quantitive idea, for he can attempt to picture all the rain of a whole twelve months, as he knows it, concentrated within the space of one. Greater precision is probably gained by considering the rainfall of Bombay in July as being eleven times as great as the average rainfall of London in July (2·4 inches). A child's attempt to visualize

this may not go very far, but at least his knowledge can be expressed quantitively with understanding, because he possesses the key knowledge concerning the climate of his own country. Yet even this key knowledge, to be worth anything, must be related to experience of several July months, for the variation from the mean may be considerable in any (or even every) one.

The same key knowledge has importance in quite a different direction. It is easily possible to place too much faith in a given figure, and the best means of ensuring that children will not take *average* statistics too literally is for them to study in detail the climate (and weather) of their home area and its representation in figures. The limited value even of monthly averages should then become quite clear. These facts about key knowledge have an important bearing on the work of the junior school. They suggest that weather observations and the keeping of weather records should have an important place in the studies of children between the ages of eight and twelve.

Comparison

Without statistics it is impossible to compare or contrast one climate with another, or to make clear the variations of a given type in different localities, with any real precision. Comparison of this kind is of inestimable value in school-work:

(i) It throws into stronger relief the characteristics of the climates compared.

(ii) It gives the type of knowledge that should check hasty generalization.

(iii) If used with skill on the part of the teacher it should become a means by which the children, with perhaps a little help, (*a*) can themselves arrive at conclusions of a simple kind (concerning, for example, the distribution of types of climate, the variations of climatic conditions with geographical position, etc.), and (*b*) can develop a genuine curiosity as to *why* certain differences or similarities hold good, thus

approaching text-book explanations with an interest born of the fact that they have felt the need to know them.

Statistics in School-work

The above considerations suggest that statistics should be used as early as possible in school geography, since they form a basis for much of the later explanatory work. On the other hand, because they cannot be interpreted without the key knowledge referred to on pp. 214–216, it is unsuitable to use them before the children have mastered at least a certain amount of this—*i.e.*, probably not before the age of about eleven years. The children themselves provide a clue as to when they are ready to hear figures, though not necessarily to *use* them. It is common experience to find that the majority of preparatory-school children of about nine, ten, and eleven years have a keen desire to know precisely *how* hot or cold a place may be, whether they have any clear conception of the meaning of the figures or not. This is akin to their interest in all things that are outstanding—the highest mountain, the deepest part of the sea, etc. Children will sometimes carry this curiosity to considerable lengths, not being satisfied until they are given the *exact* figures, and scorning anything approximate (*cf.* pp. 272–273).

As a general rule the age of eleven to twelve might be considered a suitable time to make a beginning in the real use of figures, though it seems likely that boys are able to appreciate statistics at an earlier age than girls. Several classes of boys aged eleven to twelve in elementary schools have been keenly interested in approaching simple comparative work on climate through a study of statistics.[1]

When the children are ready to use statistics it is best that they should begin with the monthly figures for a whole year, rather than with a selected few or with seasonal averages. This is partly because they cannot be aware of the extent to which a seasonal average may or may not be representative, and children are prone to take things literally. Moreover,

[1] In the author's experience.

since they are to be *used*, not *learned*—at least by any effort of memorizing at this juncture—a set of figures for the twelve months of the year is simpler, more comprehensible, than seasonal averages. By beginning with the full set children can work out their own averages for the seasons and the year, and in so doing learn much about the limited value of averages. Further, one of the best ways of gaining a grasp of the climate of a place is to make a series of graphs, and to do so the full list of monthly figures is required.

Some statistics are given in many of the more advanced school text-books. Fuller lists can be obtained from some of the books given in the bibliography at the end of Chapter IX. Figures for rainfall and temperature are easy to obtain, but those for sunshine and humidity, very important climatic data, are often lacking in school books. The teacher should endeavour to supplement the text-books at least occasionally in this direction in work with the older pupils.[1]

The following points are added for the benefit of inexperienced teachers:

(i) Time will not allow a statistical study to be made of the climate of very many countries. It is best to restrict these studies to a few stations in type areas, perhaps sufficient to represent each of the major natural regions.

(ii) Care should be taken that too many stations are not dealt with at once, and that the figures are studied without haste, perhaps not more than those for two stations in a lesson. It is often best to *dictate* the statistics *slowly*, so that the children consider each figure, and are not bewildered by reading too many at once. This simple expedient seems to add considerably to their grasp of and interest in the work.

(iii) The children should be given ample time to study the figures independently. This is probably best achieved by allowing every child to draw graphs, and to make notes about points that strike him as interesting, puzzling, sur-

[1] See, for example, E. G. Bilham: *The Climate of the British Isles* (Macmillan, 1938).

prising, and requiring comment or explanation. These notes will then form a basis for class discussion or further investigation.

(iv) Statistics for any particular station should never be used without identifying the station on maps of the country, and noting its exact position. The older pupils—of, say, fourteen years and more—should study the climatic maps in their atlases jointly with the statistics for representative localities. By doing so they come to perceive the extreme generalization inevitable in these maps, and to realize that they can be used only as a rough guide.

(v) It is important that statistics should not be used alone The numerical statements of climatic conditions have their value, but they offer at best a limited appeal to the imagination. A detailed verbal description is necessary if one is to form a full and graphic conception as to what a given temperature combined with other factors—*e.g.*, a given rainfall or humidity figure—really stands for.

Intimate Descriptive Accounts

The value of detailed first-hand accounts has already been emphasized, but a few points related to it need further consideration.

By their very nature descriptive accounts such as that quoted on pp. 212–213 often deal with what should be called conditions of *weather*, rather than of climate. That is to say, they describe the particular atmospheric phenomena which occurred on a given occasion, not the average conditions worked out for that part of the year from observations made over a long period of time. The danger in this is obvious to anyone who has made even a superficial study of our own weather. In Britain it would be impossible to select any few days as representative of the weather in a given season. For example, fogs are common in London in winter, but to the surprise of some foreign visitors it is easily possible to spend several weeks in London at that time without experiencing any fog at all. A description of a foggy day

gives no truer representation of London's winter conditions than that of a sunny or of a snowy day. Rainy days are perhaps more frequent than any others, but which kind of rainy days should be chosen?

The vagaries of our weather are familiar to every child old enough to realize that it is never possible to make any arrangement whose success depends on the weather with the slightest degree of certainty in this country. But in some parts of the world conditions are otherwise. The example quoted on p. 212 refers to a region where conditions in a given month vary comparatively little from year to year. The month preceding the rains (May in Bombay) is always intensely hot and dry, and the monsoon rains arrive with remarkable regularity on the west coast of India (the exact week varying with the locality, being earlier in the south). A large part of June is practically certain to be very wet indeed in Bombay, and slightly less hot than May. Therefore it is possible to describe weather that is typical for June on the west coast of India, and even to use an account of the weather within a few days as representative of conditions characteristic at that time of the year.

Care should be taken to ensure that descriptions of this kind are used only in cases where the weather has a certain degree of sameness, or else that the variations are made clear. In this connexion a second reason for including weather study in school geography (as a warning against over-generalization about weather in any part of the world) is apparent.

A further word of caution may not come amiss. The passing traveller, and sometimes even a resident of long standing in a given country, is apt to select and emphasize the most striking phenomena. In the same way a London child who is intensely interested when the snow lies on the ground, partly because the days when this occurs are rare, may remember winter as *the time of snow*. The few days of snow have made a clearer and more lasting impression than the many days which brought nothing by which to remember them. In a similar manner it sometimes happens that an account in a book of travel gives conditions that are the

exception rather than the rule. The foreigner who thinks that London has almost permanent fogs in November is a victim of error of this kind. A little discrimination should make it possible to avoid exaggerated accounts and to select those which, if not from standard works, at least bear evidence of experience and caution on the part of the writer. Nevertheless this consideration suggests that *verbal* descriptions should always be related to *statistical* descriptions. Care should also be taken to see that the whole year is considered. If a detailed account can be given only of one season it must be made clear that the conditions mentioned hold good merely for a limited period. The description of the rainy season in India on p. 212 badly needs supplementing by accounts of the cool season and the season of dry heat. Further, the reader should not assume from it that there is *no* fine weather in the rainy season.

Used with care, the value of detailed description of climatic conditions and their more immediate effects cannot be over-emphasized. In many cases, of course, the passages cannot be given *verbatim* to a class of children, at least in the junior school; but they supply those intimate touches which enable a teacher to bring home the facts and to clothe them with reality. In illustration it is suggested that the reader should attempt to weigh the value of the following passage[1] against that of the statistics on p. 222 and the graphs given in Fig. 39 as a means of conveying an impression, at once detailed, realistic, and precise, of the climate of the steppes in South-eastern Europe and South-western Asia.

> On the 19th of March we began a rapid journey[2] over the frozen surface of the Volga; but it was not without its hindrances. For a thaw had accompanied us from Germany to Russia, and a thaw remained our constant companion, as if we were heralds of the spring. Water, filling hollows in the ice, drenched the horses, the sledge, and ourselves, or caused

[1] Abridged and adapted from A. E. Brehm, *From North Pole to Equator* (Blackie, 1890), with the permission of the publishers.

[2] To-day this particular journey—from Moscow to Omsk—could be made by train, yet railways are so few that sledges are still the only means of land travel in winter for vast areas of Asiatic Russia.

Statistics to illustrate the Climate of the Steppes, partly by Contrast with Western European Climates in the Same Latitude

For positions of stations see Fig. 40. Cf. also Fig. 39 and description on pp. **221–226**

Station		Alt.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Range
Valencia	T.	30	44	44	45	48	52	57	59	59	57	52	48	45	51	15
	R.	"	5·5	5·2	4·5	3·7	3·2	3·2	4·8	4·8	4·1	5·6	5·5	6·6	55·6	
London	T.	18 (Kew)	39	40	42	47	53	59	63	62	57	50	44	40	50	24
	R.	110 (Camden square)	1·9	1·7	1·8	1·5	1·8	2·0	2·4	2·2	1·8	2·6	2·4	2·4	24·5	
Berlin	T.	164	31	33	37	46	55	62	65	63	57	48	38	33	47	34
	R.	161	1·5	1·3	1·7	1·4	2·0	2·0	3·1	2·2	1·8	1·8	1·6	1·7	22·2	
Kiev	T.	590	21	23	31	44	57	64	67	65	57	46	34	24	44	46
	R.	"	1·1	0·8	1·5	1·7	1·7	2·4	3·0	2·4	1·7	1·7	1·5	1·5	21·1	
Orenburg	T.	360	3	6	17	38	58	66	71	67	55	39	24	11	38	68
	R.	"	1·1	0·8	1·0	0·9	1·4	2·0	1·7	1·3	1·3	1·2	1·2	1·2	15·2	

T. stands for temperature in degrees Fahrenheit, R. for rainfall in inches (or equivalent snowfall).

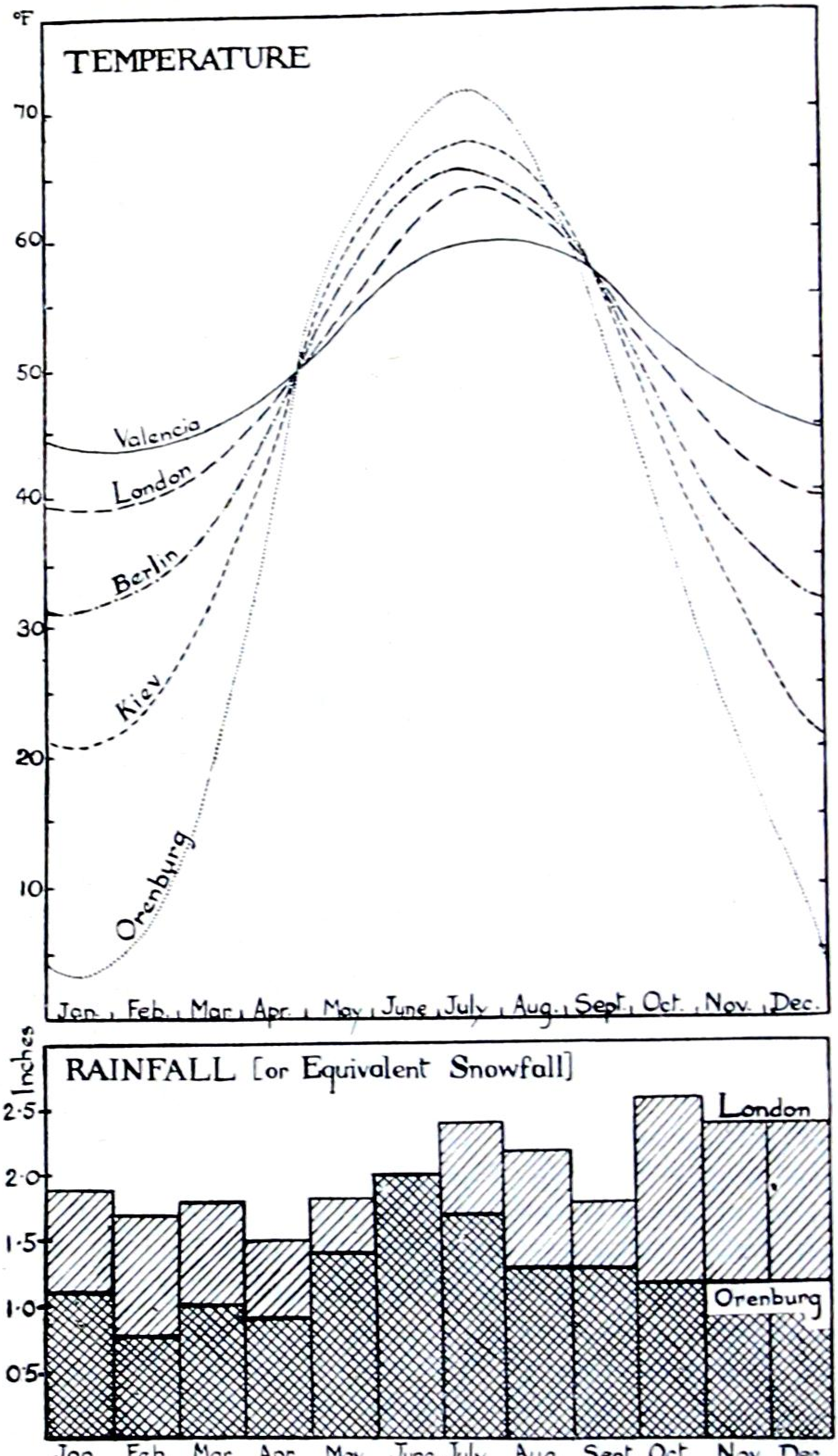


FIG. 39. GRAPHICAL REPRESENTATION OF TEMPERATURE AND RAINFALL FIGURES GIVEN IN THE TABLE OPPOSITE

For positions of stations see Fig. 40.

Note. The student should compare this representation with that given in the description on pp. 221–226.

us to make tiresome circuits. After a short time we were forced to exchange the smooth surface of the ice for the as yet unbeaten highway. Loose or slushy snow about three feet deep covered the road; to right and left ran little streams wherever they could find a course; the horses, now yoked one behind the other, strove in a pitiable way to keep their footing; with leaps and bounds they would try to keep the tracks of those who had gone in front, and at every false step they would sink up to the breast in the snow or in the icy water.

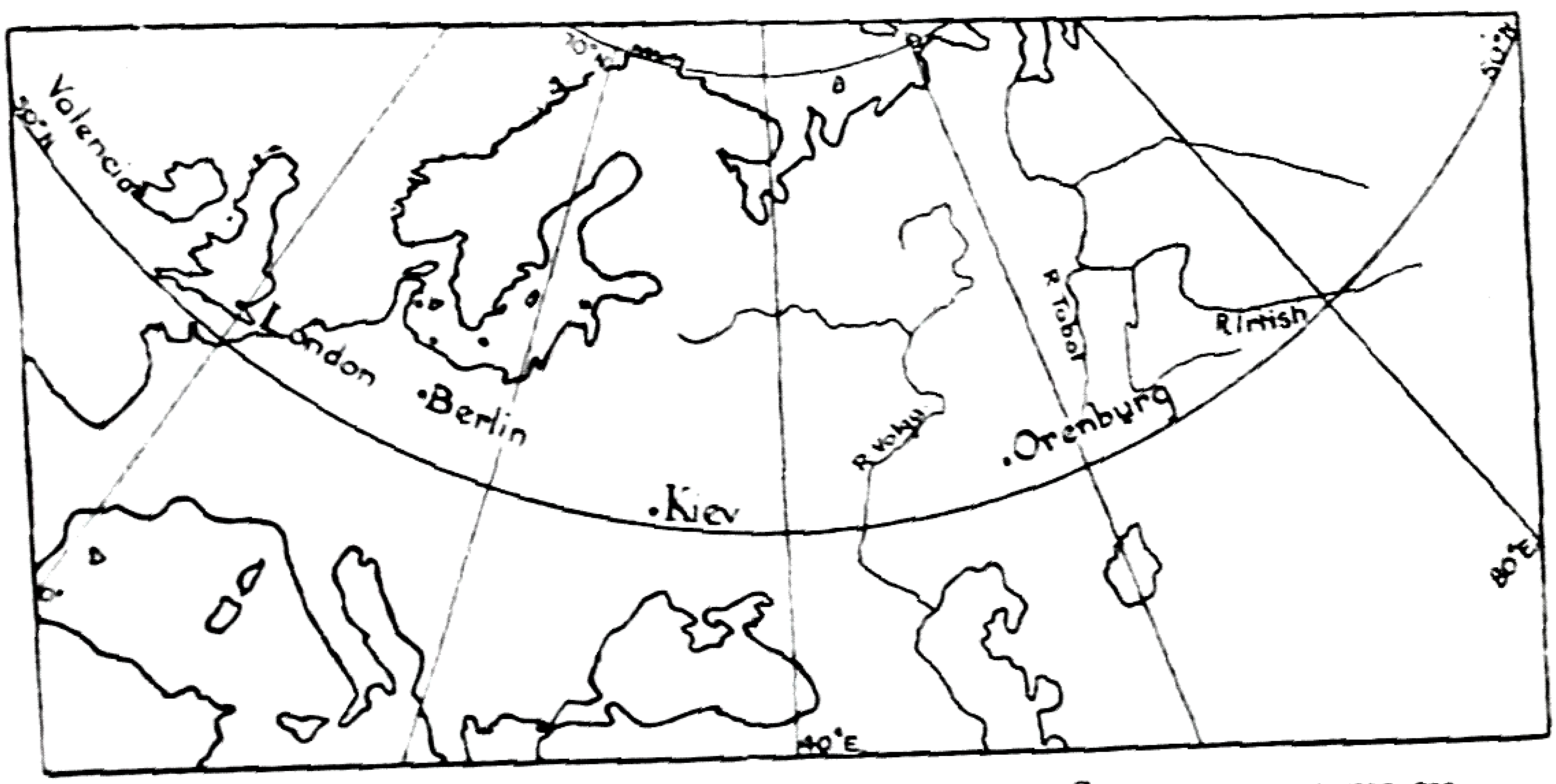


FIG. 40. MAP TO SHOW THE POSITIONS OF STATIONS GIVEN IN FIG. 39 AND OF RIVERS REFERRED TO BELOW

Painfully the journey lengthened to four or five times the proper time for the distance. The flat country was dreary and featureless. Only in the villages was there anything interesting, for the winter still kept the people in their log huts. Fur-clad boys ran barefoot through the slushy snow and mud, which older boys and girls sought to avoid by the help of stilts. Before we reached Perm we had to exchange the sledge for a wagon.

The Tobol we wished to cross on Good Friday, the 14th of April, the first day of true spring. One of the wagons was unyoked, and rolled on to the ice, but this suddenly cracked and split, and forced a hasty retreat, and it was not till Easter Day that we were able to cross the great river with the aid of a ferry-boat. So we continued our way. Before and behind us the rivers threw off the yoke of winter; only the Irtish lay still hardbound and secure beneath our feet.

Only when the life-giving sunshine is accompanied by the soft south wind at the earliest in the beginning of April, usually about the middle of the month, does the snow disappear quickly. Even before the last snow wreaths have vanished, before the ice-blocks have melted on the lakes, the bulbous plants and others put forth their leaves and raise their flower-stalks to the sun. Among the yellow grass and the grey stems the first green shimmers, buds are unpacked, and flowers unfold. Boundless tracts are resplendent with tulips, yellow, dark red, white, white and red. They rise singly or in twos and threes, but they are spread over the whole steppe-land, and flower at the same time, so that one sees them everywhere. Immediately after the tulips come the lilies. They completely dominate wide stretches of country, and in places remind one of a field overgrown with cornflowers. Usually each variety is by itself, but here and there blue and yellow are gaily intermingled. After a few weeks the steppe-land lies like a gay carpet in which all tints show distinctly. Among many plants that are unfamiliar there are old friends well known in our flower-gardens, until it seems as if one had wandered into an unending, uncared-for garden of flowers.

The animal life of the steppes also awakens. Migratory birds have returned; newts and frogs, lizards and snakes, leave their winter quarters to enjoy the sunshine. The spring sky is covered with clouds of all sorts, even in the finest weather with bedded clouds and wool-packs which stretch over the whole dome of heaven, and around the horizon appear to touch the ground.

The steppes are still green when summer steals upon them, but already their full splendour is past. The plants wither in the first few days of burning heat. Soon the gay garment of spring is exchanged for one of grey and yellow. Bright, uninterrupted sunshine beats down upon the thirsty land, for now it is but rarely that the clouds gather into wool-packs, and even if they are occasionally heavy with rain the downpour is scarce enough to lay the whirling dust raised by every breath of wind. The songs of birds are already hushed. Creeping things such as lizards and snakes abound, and the grasshoppers swarm in hosts, forming clouds when they take the wing.

Before the summer has ended the steppes have put on their autumnal garb—a variously shaded grey-yellow. All the brittle plants are snapped to the ground by the first storm, and the

next blast scatters them in a whirling dance over the steppes. They are rolled together into balls, skipping and leaping before the raging wind, half hidden in clouds of drifting dust, with which the snow-laden packs in the sky seem to be running a race.

A single night's frost covers the lakes with thin ice. Gentle north-west winds sweep dark clouds across the sky, and the snow drizzles down in small flakes. For many days the fall of snow continues; then the wind dies away, but the sky remains dark. The wind changes, and blows harder and harder from the east, south-east, south, or south-west. A thin cloud sweeps over the white ground—it is formed of whirling snow; the wind becomes a tempest; the cloud rises up to heaven; and the *buran* (a snow hurricane) rages across the steppes.

For book-list see pp. 243–244.

Note. Some of the points mentioned in this chapter are illustrated in an article on "The Cycle of the Seasons in the Middle East," by W. C. Brice, in *Geography*, June 1950.

EXPLANATION OF CLIMATE

Explanations needed in the Junior School

THE maxim 'description before explanation' would be carried too far if it were taken to mean that explanations should be withheld indefinitely. Two important facts suggest that a certain amount of explanation of climate is essential in school-work:

(i) The children themselves ask for it.
(ii) Only when the principles explaining the variations of climatic conditions are grasped can the distribution of the world's climatic types be considered with anything that approaches understanding.

In junior-school work the first reason is undoubtedly the most important, and with children younger than eleven to twelve it would probably be a safe rule that explanations should be given when, and only when, the children ask for them. This is not seldom, if the teaching follows lines that are educationally and geographically sound. To know, for example, that Bombay receives as much rain in July as London has in a year is for most children of eleven years to want to know *why*. In fact, though genuine enough, children's questions can become embarrassingly numerous and penetrating. They provide valuable topics for lessons, or, still better, for 'research' by the children, and it often happens that when approached in this more indirect way the explanations are more readily and quickly understood than when they are presented in the direct manner of text-books. (Actually for the children the text-book approach is often the indirect one.)

In the first instance, all that the children want to know are the observed facts—the climatic conditions—especially as they are reflected in details of daily life. If on learning these facts the children are so impressed by them that their curiosity as to causes is aroused, then there can be no better training of its kind than the pursuit of climatic explanations, for these explanations not only demand an attack on new knowledge (often in other fields than that of pure geography), but also call for logical reasoning, cautious deductions, and care in the making of statements. Moreover, the children learn to 'think' with the minimum of teaching when they are seeking reasoned explanations for which they themselves feel the need.

All things considered, however, including the small amount of time available, it is likely to be found that the nature and number of climatic explanations to be mastered by children before they leave school are limited. With a few doubtful exceptions, it is probably right to insist that no specified explanations should be demanded from children leaving the junior or preparatory schools at the age of eleven to twelve. Yet to be able to think intelligently about the climatic types and their distribution a certain minimum of important principles is essential, and at the age of eleven to twelve children should be beginning to acquire them. The more intelligent children have often by this time developed a genuine curiosity concerning some of these explanations, and the geography teacher's chief handicap is the lack of sufficient time in which to follow up the children's questions. Given the opportunity for these problems to be approached as answers to questions, certain rudimentary explanations can be grasped by children of average capacity at this age.

The following list gives examples of what might be called 'fundamentals' in work with climate. If attacked in the right way they can be understood by children of eleven to twelve years of age, at least sufficiently well for the children to begin to use them as material with which to build up further explanations of climatic conditions when these are needed.

'Primary' Explanations

(i) The explanation of summer warmth and winter cold. How it is that when the sun ascends high into the sky the weather is warmer than when the sun remains low.

(ii) Why the amount of heat received from the sun is greater in low latitudes than it is in high latitudes.

(iii) How rain is caused. (This offers peculiar difficulties, and is discussed later on.)

(iv) Why it is that as a rule the air grows cooler as one ascends, so that, for example, mountains even at the equator have permanent snow if they are high enough.

Rudimentary knowledge of the type indicated above is needed in the more advanced explanations, which as a general rule should be postponed till after the age of twelve. The following is a representative list of what might be called 'secondary' explanations. Some of them can only be made on a basis of 'primary' explanations.

More Advanced Explanations (best postponed until after Twelve Years)

(i) What makes the sun climb higher in the sky in summer than in winter? Why does the sun rise earlier and set later in summer than in winter, etc.?

(ii) What makes it possible for deserts to exist? How is it that such a great area as the Sahara can have so little rain?

(iii) Why are places near the sea—*e.g.*, Valencia—in many cases so much warmer in winter and cooler in summer than places far inland—*e.g.*, Moscow?

(iv) Why do some parts of the world have dry seasons and wet seasons? For example, why does Bombay have nearly all its rain in a few months in summer, Jerusalem nearly all in a few months in winter, etc.?

(v) What causes the thunderstorms to come nearly every day in New Guinea (or other equatorial regions)?

In most cases these more advanced explanations may be called for by the children's questions well before the age of

twelve. Yet, on the other hand, some of them—*e.g.*, (v)—cannot be considered *essential* knowledge to be expected from a pupil leaving school at, say, fifteen, however attractive they may appear to the enthusiastic student of climate.

It will be seen that in both the above lists each problem is stated so that causes of known phenomena are sought. That is, the approach is made in the child's way, not in the way of those text-books which start with the causes and end with the phenomena they produce. It is better to leave these explanations entirely alone if time does not permit them to be approached in the way that is educationally sound. The evils of teaching them to the children rather than leaving (or leading) the children to seek them out and grasp them at their own time and in their own way seem to be illustrated in the results produced. Students who have just completed school courses in geography come to college with a lamentable absence of understanding of these 'fundamentals,' in spite of the fact that they may show a vague awareness of certain terms or phrases associated with the explanations! It is often apparent that the students have been 'taught' these things, but they have not learned them—*i.e.*, grasped them and made them their own.

Three reasons are suggested as possible explanations for this common vague acquaintance with mere terms in lieu of understanding:

(i) That the pupils were 'taught' explanations before they had felt the need to know them—*i.e.*, without the appetite of curiosity or interest on the children's part.

(ii) That the pupils did not attack them for themselves in their own way, but were obliged to follow a preconceived line of development, from text-book or teacher.

(iii) That they were not mentally equipped for this kind of study, either (*a*) because they were at the time too young or (*b*) because some of the rudimentary knowledge of physics, gained from observation and experience, on which these explanations must be based was assumed to exist when actually it did not, with the result that what should have

been perceived as an *actuality* that *takes place* became to the child merely a string of words or phrases, which he might or might not be successful in putting together correctly on a later occasion.

It is better to be admittedly ignorant than to have blind facility in using words whose meaning is hidden. Yet it is possible for children to gain such understanding of simple scientific facts that they can express these facts in their own language, possibly crude, but often more telling and sometimes richer in meaning than the stilted words of the textbook. This can only be done when the child sees the truth as an actuality, the only way in which the rudimentary facts about climate can properly be perceived. They must figure in the child's mind through sensory images, not empty terms (*cf.* pp. 25–30). On the other hand, the teacher needs to remember that only on a basis of such actualities can be built the abstractions that the older pupil or student may have to make. Therefore before the age of fifteen to sixteen years the work should be related as far as possible to matters of experience, leaving the abstractions about climate to be developed later, when the mind of late adolescence is more capable of abstract thinking.

Given the right approach at the right time, children are capable of understanding much more than is commonly supposed. A child who is bewildered when the teacher uses abstract terms can pursue an explanation to great lengths when it is presented in terms of concrete things. When their interest is aroused children are only too anxious to go deeply into a problem, and teachers sometimes err in failing to satisfy a hunger for rich intellectual fare, albeit of a concrete character.

The topics for explanation in both lists given above (at p. 229) are all related to questions that may be asked by the children themselves, and some—*e.g.*, 'What makes rain?' —often have to be dealt with by teachers of quite young children—teachers who may not possess much geographical knowledge. Explanations which are simple and suitable for children must not be false to facts as understood by men of

science. First ideas are generally the most persistent, and even if this were not so it should not be necessary for children of twelve to fourteen to unlearn that which was taught them a few years before. It is therefore of great importance that the simplified explanations given to inquiring children in the junior school should be scrupulously correct so far as they go, and for this reason it may be helpful if one of the explanations commonly demanded by children is considered briefly here.

As an example the 'origin and formation of rain' has been selected, because in attempting this explanation many teachers who are not in touch with modern meteorological knowledge still make the mistakes which were condemned many years ago. The example is also used to illustrate two methods of approach in explanations of this kind. The sequence of reasoning suitable for children—or for any pupils who have everything to learn in this connexion—is different from that which can be followed by older students equipped with some knowledge of the subject, and therefore capable of beginning at the fundamental cause. For this reason the explanation of the cause of rain is worked out in two ways, the first, for advanced pupils, commencing with what the scientist perceives to be the fundamental cause, the second, for beginners, starting with the observed facts or results.

Example of a 'Primary' Explanation: the Causes which produce Rain

Explanation I (for Students already acquainted with the Physical Facts)

(i) The formation of rain is practically always associated with the rising of air, generally of air which has a relatively high humidity.

Air may rise under one of the following circumstances (or a combination of more than one):

(*a*) The existence of rising ground in the path of a wind, causing relief rain.

(*b*) The passage of a cyclonic disturbance, bringing cyclonic rain.[1]

(*c*) The occurrence of convectional movements in the air, producing convectional rain.

In each case the upward movement is seldom if ever vertical, the rise being often so slight that the gradient is imperceptible to an observer.

(ii) The fact that it rises causes the air to become cooler, through adiabatic cooling. This is because:

(*a*) As the air rises the pressure upon it (weight of air above and around it) grows less. Therefore the mass of rising air expands.

(*b*) Expansion can only take place by using up energy. This energy is drawn from the heat energy of the air. Therefore air which expands under these circumstances grows cooler.

(iii) All air contains water-vapour, but the amount of water-vapour any mass of air can hold depends on the temperature of the air. A mass of cold air cannot hold so much water-vapour as the same mass can hold at a higher temperature.

When a mass of air is cooled sufficiently the temperature known as dew-point is reached. At this temperature the air is saturated, and begins to give up some of its water-vapour. If the rising air is cooled below dew-point condensation takes place, and clouds begin to form.

(iv) As the rising and cooling continues the water droplets of which the clouds are made grow in size by coalescing, until they can no longer be supported by the rising air. They then fall to the earth as rain-drops.

The above explanation, even when amplified by fuller details, in its present sequence is unsuitable for children younger than about sixteen years. It begins far away from

[1] It is important that the air-movements in a cyclone should be clearly understood in this connexion, at least by the teacher. Students should consult up-to-date works on the subject (see bibliography).

the immediate topic—the rain itself. Before the student reaches the statement about rain falling he must maintain his interest in a long piece of reasoning, perhaps, if he is of the 'slow' type, not always seeing clearly where he is going. For children an explanation following the reverse order is generally the best. It is also necessary to ensure that the children should know where they are at each step. In the explanation given below it will be seen that each point answers a question likely to be put by a child who understands the preceding point.

Explanation II (*Synopsis*)

(i) Rain comes from clouds (but not all clouds).

(ii) Clouds, like mist, are made up of tiny water-droplets. These droplets, which are large enough to be seen in the mass, have been formed from the invisible water-vapour that is always present in the air.

(iii) Water-vapour in the air condenses—*i.e.*, forms droplets that can be seen as mist or cloud or dew—when the air is cooled sufficiently.

(iv) Cooling of air takes place when the air rises.

(v) Rising air grows cooler because as it rises it spreads out, or expands, and in expanding it uses up energy—its own heat energy. A mass of rising air expands because the pressure, or weight of air above and around it, grows less the higher the mass of air rises. (Air is always pressing outward in every direction, and when not held in check by opposing pressures it must spread outward. Air in a balloon is held in check by the strong pressure of the skin of the balloon. If a hole is made in the skin pressure is released at that point. Therefore the air pushes out through the hole—*i.e.*, it expands where pressure is released. Moreover, it grows colder in so doing, and feels cold to the hand as it rushes from the hole.) Cooling under these circumstances—by expansion through release of pressure—is known as *adiabatic* cooling. It might be said that the act of rising causes the air to cool itself.

(vi) Either of the following causes may force air to rise:

(*a*) *When a wind has to pass over rising ground* the upward movement given to the wind may bring about cooling of the air sufficient to cause rainfall. Emphasis must be placed on the fact that the whole mass of air is cooled throughout by its own expansion, *not* by "contact with cold air," still less by encountering "the cold mountain-top."

If the wind is heavily laden with water-vapour (*e.g.*, after passing over the sea) quite a slight rise in altitude may be sufficient to cause heavy rainfall. For example, the wet winds from the Atlantic bring in an average year 36·2 inches of rain to Plymouth (altitude 116 feet), at the coast, and 81·5 inches to Princetown (altitude 1359 feet), only fourteen miles away, on Dartmoor. Yet even in the Sahara the high-plateau regions of Tibesti and Ahaggar receive enough rain for plants to flourish and many temporary streams to flow.

(*b*) *When certain atmospheric disturbances take place* some air-masses affected by them are forced to rise. In England there are two main kinds of atmospheric disturbance:

(i) *A cyclone* or *depression,*[1] often announced in the wireless weather forecast. This kind of disturbance is very common in Britain, and may take place at any time of the year.

(ii) *A convectional disturbance*[1]—*e.g.*, that which often gives rise to a thunderstorm or thunder-shower. This kind of disturbance is much commoner in hot countries than in Britain.

If for either (or both) of these causes a mass of air is made to rise it becomes cooler in so doing, and may be chilled so much that clouds are formed; and then, as the process continues, the droplets of water grow bigger and bigger, till the air cannot support them, and they fall to the ground. The cooling of the air has forced it to give up some

[1] These and other scientific terms are naturally used at the discretion of the teacher, according to the age and capacity of the children. For fuller details, which any teacher should know, see the books in the bibliography at the end of this chapter.

of the water-vapour that was in it, and this reaches us in rain-drops.

For the sake of conciseness the above explanation is stated in language which is not the children's, and is given far more briefly than would be possible in school-work. It needs to be elaborated, so that the facts in each step are seen as a series of visual images. It should call up memories of clouds and cloud-forms, of different kinds of rain-drops and rain-showers. It should lead to observation—*e.g.*, of cumulus clouds, whose flat bases mark the level at which condensation begins in the rising air, and whose passage *horizontally* across the width of the sky, often without perceptible increase in size, suggests the fact that the gradient of the upward movement cannot be observed.

There should also be a fuller use of comparison with familiar objects and experiences. Yet care should be taken to avoid any comparison that does not bear close relationship to the subject on hand. In particular it should be noted that no reference is made to the steam of a kettle, an illustration frequently used in older text-books. The extent to which the cloud produced by the steam of a kettle is comparable to a cloud in the sky may be clear to an adult who can, by a mental effort, ignore the effect of special heating in producing the steam-cloud from the kettle. But to a child the steam-cloud is due in the first place quite rightly to the heating of the kettle sufficiently to boil the water. The student who knows enough physics understands that water can be evaporated only with the use of latent heat, that a certain amount of heat is used up, even in cold regions, when water is evaporated—*e.g.*, from the sea. But special local application of heat is not necessary for cloud-formation. Further, and of more importance, the formation of a steam-cloud from a kettle as the child sees it is largely due to the *contact* of the hot (and invisible) water-vapour with the cold air. Therefore it emphasizes the wrong explanation, since it does not suggest adiabatic cooling as the cause of condensation in a cloud.

The complete explanation of the causes of rain demands precision of thought and statement, and therefore gives

valuable training in thinking and in the use of words. An example of slipshod expression, and no doubt also of careless thought, is a statement commonly made by students: "The air rises, cools, condenses, and falls as rain"—*i.e.*, the entire mechanical mixture of gases, not merely one of its constituents, is converted into water in the process of precipitation!

Explanations of Climatic Types and Other Advanced Explanations

The explanation discussed above is one of several primary explanations which are generally assumed in more advanced work—*e.g.*, that dealing with climatic types: continental and maritime climates, Mediterranean climate, equatorial or monsoon rainfall *régimes*, etc. As mentioned earlier, although more and more details about climates (as they are observed or experienced) are learned in the secondary school, *explanations* of climatic types likely to be mastered are very few. Those attempted should be selected for their general usefulness in making clear the distribution of climatic types, thereby helping the children to arrange their knowledge more tidily in their minds, and equipping them on leaving school with a store of useful knowledge. For example, an emigrant from England to Canada would know that he could not expect a close approach to home conditions of climate anywhere east of the Rockies.

It is necessary to guard against giving the children the impression that *everything* can be related to an ordered system, that all the climatic regions can be fitted together to make a convenient pattern. The work would be more wisely planned if it aimed at helping the children to understand climatic differences, without attempting to fit climatic regions into a map, like a jigsaw puzzle. Nothing so advanced as a full survey of the climatic regions of the world (after Herbertson or any other) should be attempted. This demands a mental equipment not found as a rule before the standard of university work is reached.

Apart from any other objection, the danger of interpreting

the regions too literally, of accepting boundaries as definite because they must be drawn as lines, is too great for any but the advanced student to cope with successfully. This danger may be at least equally great in the rudimentary work with major natural regions (savanna, steppe, tundra, etc.) for children as young as ten to eleven. But in that case the difficulty may be overcome by the fact that no *complete* survey is attempted, and only small representative areas are studied.

Wind Systems

The most rudimentary explanation of the climatic regions of the world demands some knowledge of prevailing winds. As soon as the children begin to ask for explanations of climatic conditions one of the factors they learn to investigate is the direction and nature of the winds that affect the area under discussion. At first the wind direction (or directions) characteristic of any region should be accepted, and learned simply as a fact, as one of the climatic conditions of the area. When their study includes any reference to wind children can profitably mark directions of prevailing winds, seasonal or otherwise, on the maps they make of the country, continent, etc. They should also refer frequently to maps showing the wind systems of the world in their atlases—*e.g.*, to discover for themselves the prevailing winds in a given area. This is often needed as a preliminary step in seeking explanations of rainfall or other climatic conditions. A child aged, say, eleven who wishes to find out why Bombay has so much rain in summer, and in summer only, will discover from his atlas-map that the wind blows strongly towards Bombay from the sea in July, but in the reverse direction during the cool season. When he combines this information with other knowledge about relief, gained from a relief map, he is in a position to account for the summer rainfall in Bombay (so far as it is possible for him to do so in the light of his knowledge concerning the formation of rain, as yet his only equipment in this direction).

After they have been using wind maps for reference for

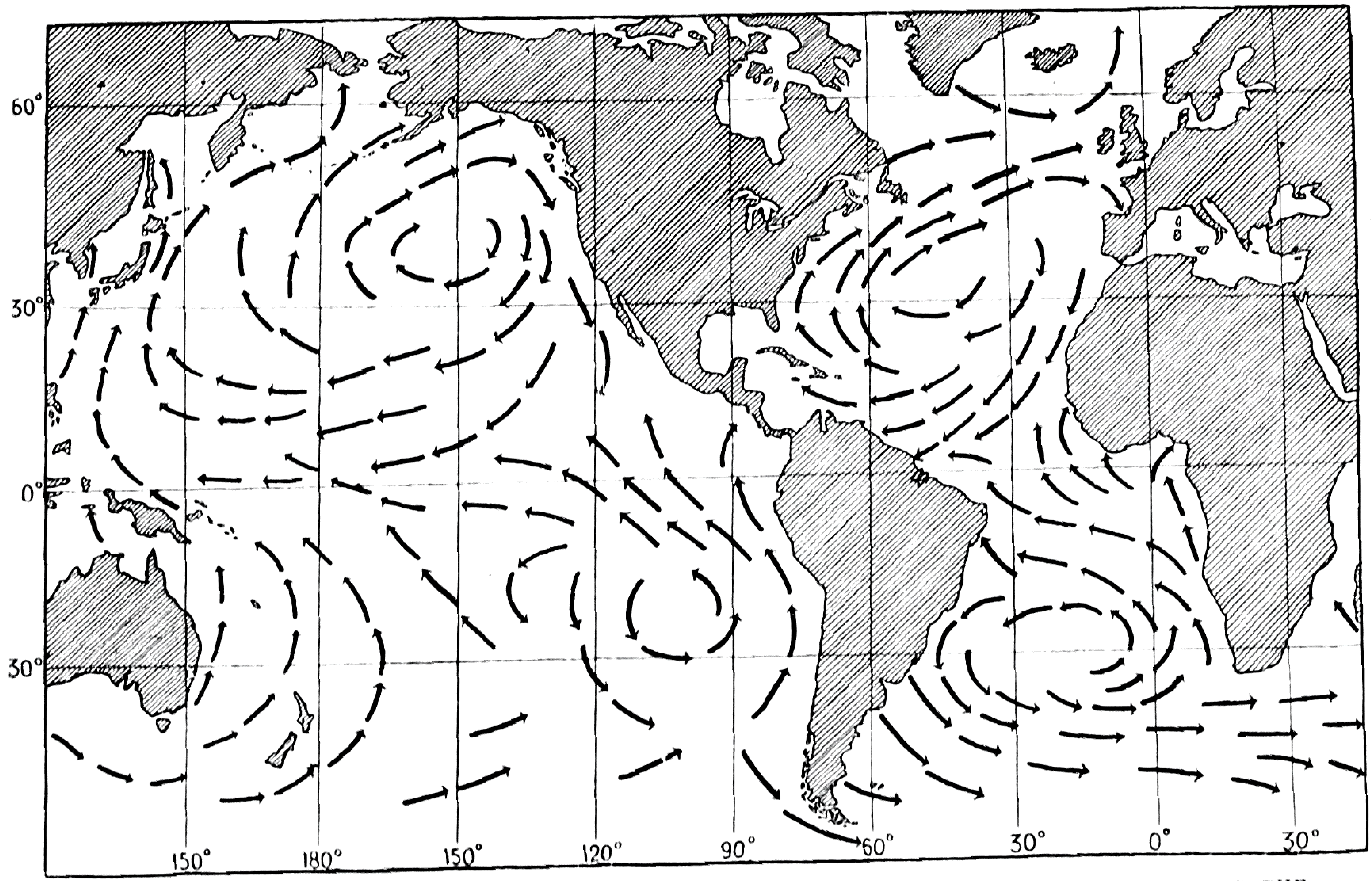


FIG. 41. MAP SHOWING DIRECTIONS OF SURFACE WINDS RECORDED MOST FREQUENTLY OVER THE PACIFIC AND ATLANTIC OCEANS IN JULY (GALL'S PROJECTION)

some time the children should be led to recognize the fact (if they do not, as is likely, discover it for themselves) that there is a certain amount of order and system to be traced in the winds of the world as a whole.

Children are often attracted by maps like that in Fig. 41, and enjoy studying them. If they were introduced to wind systems of the world through *direct* study of wind maps children would probably arrive more nearly at the truth than when they are given the 'wind-belt' diagram of many text-books (see Fig. 42). Fig. 41 makes it clear that winds do not blow in continuous belts. The children should trace for themselves the wind *whirls* associated with the land- and sea-masses. They will no doubt recognize the fact that there is a tendency for the whirls to occur in 'rows' from east to west, as represented on the world map. If the winds are marked in some detail on a slate-surface globe the 'wind-belts' vanish away altogether, at least in a form approaching that shown in Fig. 42, while the wind whirls stand out clearly in their relation to alternating continents and oceans.

There is in reality no *continuous* 'belt' of winds, except that of the westerlies in the Southern Hemisphere, where there is practically no land area, at least of a size sufficient to affect pressure and wind conditions. But to visualize it correctly this 'belt' should be seen either on a globe or on a hemisphere map, with the pole in the centre. It is then apparent that these westerly winds form a whirl around the Antarctic Circle.

It is easy to theorize about a planetary circulation—*i.e.*, in belts—which ignores the existence of land and sea. But geography of to-day concerns itself with actualities before theories, and since wind-'belts' in the old sense do not exist there is no reason why they should ever be mentioned in school—still less taught! Yet the learning of wind-belts as actualities does not necessarily mean that they are what the teacher intends to teach. The fact that children see things as actualities makes it difficult for them to accept an hypothesis. From the point of view of the children, as well as of the subject, geography should not deal with what ***might be***

before the need is felt for an hypothesis to explain things that *are*.

If climatic explanations cannot be given to children

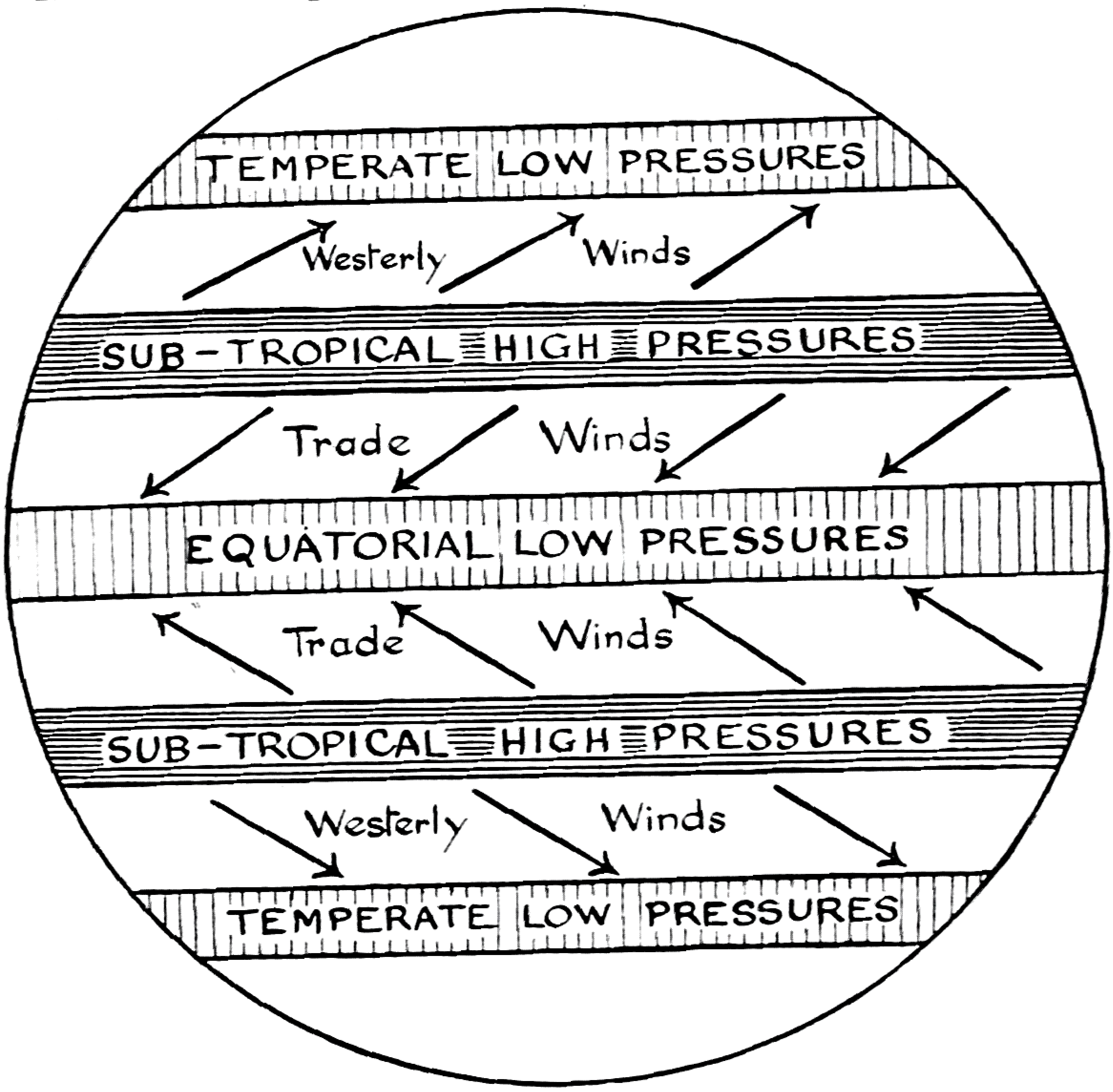


FIG. 42. DIAGRAM WHICH SHOULD NOT FIGURE IN SCHOOL TEACHING

It shows the wind systems that *might* prevail if land and sea did not alternate on the earth's surface. Climatologists emphasize that this diagram does *not* show the facts as they exist. Yet many children learn it in school as if it showed established fact!

without reference to wind-'belts' they should not be given at all. On the other hand, a pupil who really grasps the existence of the major and minor wind whirls is equipped with some essential 'tool knowledge' for the working out of many climatic explanations.

The Need for Caution in attempting the More Advanced Explanations

In their search for truth scientists from time to time put forward theories—*i.e.*, statements of *possible* explanations of facts *so far as they are known*. Climatology is a new science, using data of which only a fraction has as yet been collected. It depends in part on the findings of other sciences—physics, meteorology, astronomy, etc. Workers in these sciences are frequently discovering fresh truths, which provide new material for the climatologist to work with, and which enable him to arrive more nearly at the truth he is seeking, though from time to time they make it necessary for him to modify, or even to cancel and reconstruct, his theories. Since climatologists are the first to declare that they need much wider knowledge before they can state their theories as proven facts, it is not for the geographer to take those theories and teach them as part of his science, assuming them to be established truth! Therefore geography teachers should exercise great care when called upon to give explanations, particularly of such matters as wind systems, for these are among those parts of climatology which are less well understood by climatologists. Among other things, they demand a fuller knowledge than is at present available of the conditions in the upper atmosphere over large areas of the earth.

Explanations of the wind whirls are probably too difficult for any but university students. To understand the causes of the Indian monsoon,[1] so far as anyone is able to do so, demands a capacity to perceive a complex subject with breadth of mind and yet critically, with imagination and yet not too literally. These attributes are found only in a mind that is to some extent trained, and equipped with a background not usually present before university age is reached.

Moreover, a geographer is mainly concerned with *how*,

[1] See G. C. Simpson in the *Journal of the Royal Meteorological Society*, July 1921.

where, and *whence* the winds blow, not *why* they blow as they do. That is a matter for the meteorologist, and even he would frequently hesitate to offer a complete explanation.

It is probably safest to postpone all but rudimentary explanations until the pupils can seek them for themselves in up-to-date standard works. At least, there should be no learning by rote, which seems to be the only way in which some students can 'master' climatic explanations! The training in thought which these explanations should provide becomes a negative quantity when the subjects concerned cannot be seen at each step 'in the mind's eye.' Probably, however, to learn an explanation by rote when it cannot be understood is most to be condemned on the grounds of insincerity.

If the teaching is really good the safest index to the extent and nature of the explanations to be included is the interest of the pupils. Children are rarely interested in an explanation which they do not understand.

SOME USEFUL BOOKS AND ARTICLES

Larger Works of Reference concerning Climate

BROOKS, C. E. P.: *Climate: A Handbook for Business Men, Students, and Travellers* (Benn, 1933).

KENDREW, W. G.: *Climatology: treated mainly in Relation to Distribution in Time and Place* (being the third edition of *Climate*) (Clarendon Press, 1949).

—— *The Climates of the Continents* (Oxford University Press, 1954).

MILLER, A. AUSTIN: *Climatology* (Methuen, 1944).

Works mainly concerned with Weather-study or Meteorology

ABERCROMBY, R., and GOLDIE, A. H. R.: *Weather: The Nature of Weather Changes from Day to Day* (Kegan Paul, 1934).

PICK, P.: *A Short Course in Elementary Meteorology* (H.M. Stationery Office, fourth edition, 1933).

SALTER, M. DE C.: *The Rainfall of the British Isles* (University of London Press, 1921).

BILHAM, E. G.: *The Climate of the British Isles* (Macmillan, 1938).

LESTER, R. M.: *Everybody's Weather Book* (Sampson Low, Marston, 1948).

BALCHIN, W. C., and RICHARDS, A. W.: *Climate and Weather Exercises* (Harrap, 1949).

BRUNT, D.: *Weather Science for Everybody* (Watts, 1936).

—— *Weather Study*; ed. H. Levy (Nelson, 1942).

KIMBLE, G., and BUSH, R.: *The Weather* (Pelican Books, 1943).

TINN, A. B.: *This Weather of Ours* (Allen and Unwin, 1946).

HARE, F. K.: *The Restless Atmosphere* (Hutchinson, 1953).

CHESTERS, A. O.: *Weather*. "What Causes Things" Series (Educational Supply Association, 1951).

HOOD, P.: *The Atmosphere*. "Oxford Visual" Series (Oxford University Press, 1952).

MANLEY, G.: *Climate and the British Scene* (Collins "New Naturalist" Series, 1952).

The Admiralty Weather Manual
The Meteorological Glossary
The Weather Map. An Introduction to Modern Meteorology
British Rainfall (published annually)
(H.M. Stationery Office)

ROYAL METEOROLOGICAL SOCIETY: *Weather: A Monthly Magazine for All Interested in Meteorology.*

Meteorology in Education (Philip, 1934).

MILL, H. R.: "Meteorology in Schools," in the *School Science Review*, September 1924.

WILMORE, A.: *Experimental and Open-air Geography* (Bell, 1930).

The Daily Weather Report. To be sent daily: obtainable from the Meteorological Office, Air Ministry, Kingsway, London, W.C.2. A short explanatory account of the weather conditions month by month is included with this.

From time to time valuable articles appear in *Geography* (published quarterly by the Geographical Association). Examples are: "The Geographer and the Study of Climate," by M. I. Newbigin (1928); "The Monsoon Weather in India" and "The Teaching of Temperature" (June 1933); "Cloud and Rain," by J. Fairgrieve (March 1942); "The Formation of Land Fogs," by N. Pye (September 1944); "Frost and the Fruit Grower," by R. Bush (September 1945); "The Interpretation of the Daily Weather Report," by J. H. G. Lebon, and "The Cold Spell—January to March 1947," by R. T. Cornish (both published in the June number, 1947).

RELIEF AND RELIEF MAPS

THE NEED FOR INTRODUCTORY WORK

In almost any geographical study of a given region a sound knowledge of the relief is a fundamental necessity. This knowledge cannot be gained satisfactorily without the help of good orographical maps, and therefore the training of children to use relief maps seems to be of sufficient importance to be considered in a separate chapter.

The most suitable method of showing relief in atlas- and wall-maps is by layer colouring.[1] Since a layered map is made from a contoured map by colouring it it might be assumed that a knowledge of contouring should precede that of layer colouring. Actually, however, layered maps can, and often must, be used by children before they attempt the reading of contour-lines alone. Moreover, experience indicates that normally intelligent children arrive at a surprisingly sound grasp of contouring simply by using large-scale layered maps of places they know well. In the preparatory work now to be discussed the aim is not so much to teach contour-lines as to give the children a satisfactory working knowledge of the meaning of layer colouring—more especially of its limitations—so far as atlas- and wall-maps are concerned. Yet though the emphasis is placed on the colouring in the first instance, the contour-lines cannot be ignored, and attention is turned towards them more and more as time goes on. By about fourteen years of age a child should be able to read an uncoloured map such as the 1″ Ordnance Survey, popular edition.

The work suggested for children of nine, ten, or eleven years of age cannot be in any way complete. A perfect understanding of all kinds of relief maps can be gained only

[1] See p. 119.

by experience, including work in the field. The teacher should see that the children's understanding of relief maps is not taken too much for granted, but that it is being developed from stage to stage.

The need for careful introductory work is made clear by the frequent misconceptions that arise when children begin to use layer-coloured atlas-maps without it. It is common to find children who vaguely imagine that green signifies a green countryside—*i.e.*, grass or 'fertile land'—and that any shade of brown implies bareness—*i.e.*, brown earth or rocks or sand. Many children who have been using layer-coloured maps for a number of years are astonished to discover that parts of the Sahara are marked in green, and that these are not necessarily 'fertile patches.'

In this connexion it is important for the teacher to remember that children are apt to take things literally. They *see* the green colour; they are used to seeing or imagining a green countryside. Symbols which bear no clear resemblance to the thing they stand for are unintelligible to a child until he has made them part of his experience. No amount of mere telling can give him understanding, though it may teach him to avoid mistakes in verbal statements. To make the knowledge his own a child must acquire it through experience in situations that are real to him. The teacher's task is to create opportunities in which those situations will arise, and so to guide the child's activities that his experience gives him the understanding required.

That the teacher's guidance is not invariably in the right direction may be illustrated by a common mistake. In lessons on East Anglia children are frequently led to 'deduce' that the country is *flat* (which in many parts is not the case) from the fact that it is coloured green on the map (*cf.* p. 256).

In the following pages several methods of approaching the use of relief maps are discussed in the light of two principles referred to in previous chapters: (*a*) that the approach must be direct and natural considered from the child's point of view; (*b*) that the matter must be correct and true to itself geographically.

I. The Approach through the Use of Models

A number of school text-books introduce the representation of relief by means of diagrams showing model hills, etc. Perhaps this is the only method possible in a book that is to be used in *any* school. It is not a method that fulfills the principles stated above.

The child is required to make or to imagine a model of a

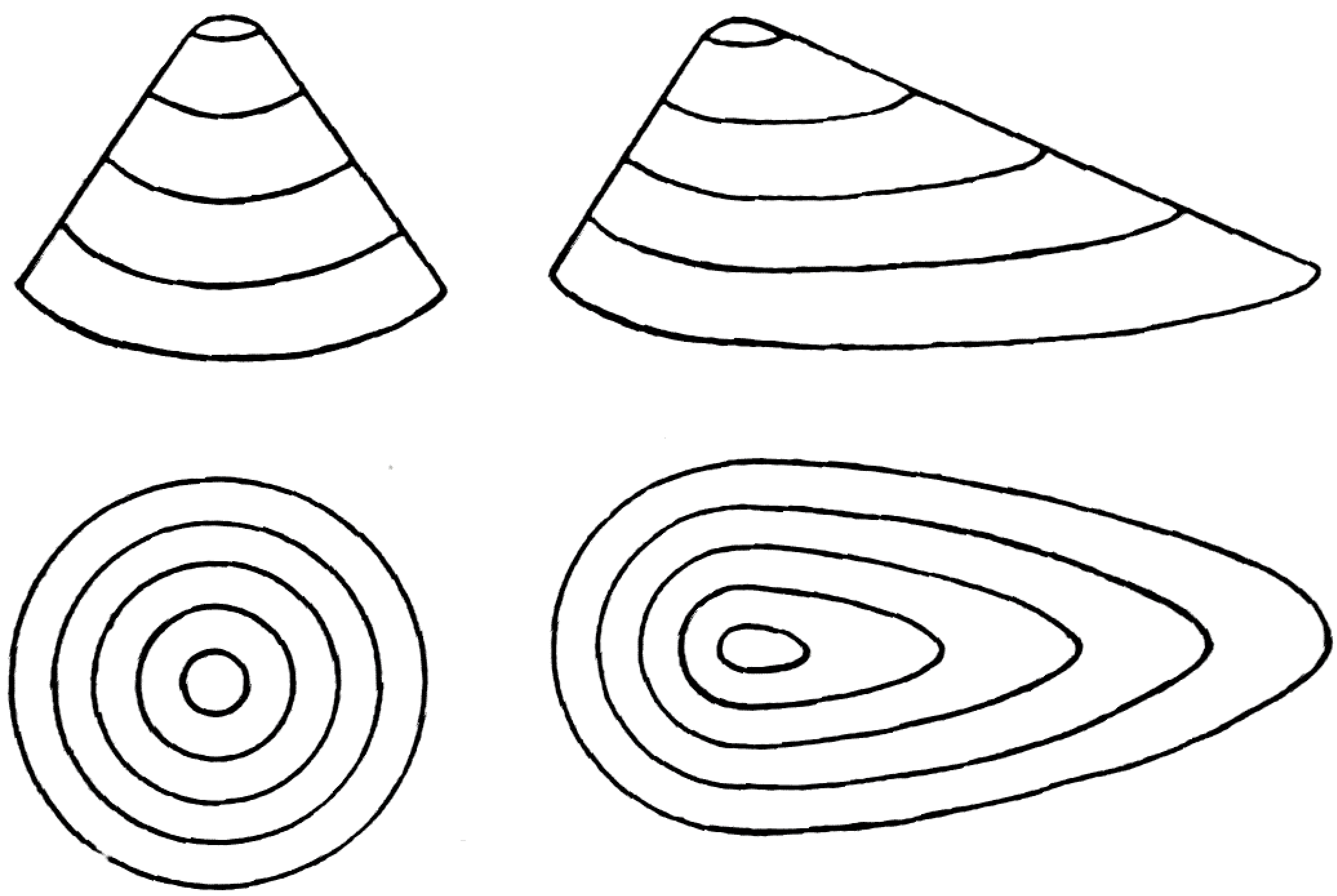


Fig. 43. Example of a Type of Diagram used in Several Children's Text-books to explain Contour-lines

For points of criticism see below.

hill which in some cases is simplified to such an extent that it is shaped as a perfect cone, a condition practically never found in nature (see Fig. 43). Its form in plan and section is unconvincing in its perfect symmetry. Each slope has such uniformity of gradient that it is unlike those of any hills known to the majority of children. Moreover, it is a model, and as such is in any case remote from reality. To approach the representation of relief merely by contouring a model is to militate against one of the major aims in the introduction to maps. When relief maps are read and studied in later work the children should visualize landscapes, real

slopes, and real hills in all their immensity and variety of surface—not models.

It is often suggested that the contour-lines should be marked on the model by submerging it in water of increasing depth—one inch, two inches, etc., the surface-level of the water providing the contour-line to be marked round the hill. Such a method is no doubt conveniently simple; but it is of doubtful value educationally, since it is untrue to the subject that it attempts to teach. Contours are not made in that way.

A model is always artificial, even when it represents country more nearly true to nature than the model referred to above. If models are to figure at all in the work they should be made *by the children* to show a piece of country that is familiar to them, preferably close to the school. A model of this kind is better made at a later stage in the course, when the children can set to work upon it with fuller understanding, and when its construction serves as a means whereby the children can *express* their knowledge both of the relief of the neighbourhood and of the contouring by which it is represented. By the study entailed in making a relief model in these circumstances the children widen their grasp of contouring. At the same time, because they have a familiar piece of country in mind it is clear to them that both map and model are symbolic. There is then little risk that the children will begin to visualize relief models rather than realities when reading a map. (For fuller details about actual construction see pp. 264–268.)

II. The Approach through Local Map-work

First Attempts at representing Relief

During the first steps in map-making there often arises a demand for some means by which the children can indicate a familiar slope or hill in their maps of the neighbourhood. At first it is best to allow the children to represent it in their own way, even if they do so by drawing a picture of the hill. They seldom remain satisfied with this for any length

of time. Sometimes in a hilly neighbourhood a solution may be found by helping the children to make a map which marks off all the land higher than the school gate (or other suitable landmark) from all the land lower than this, on their large-scale local maps. The children obtain their data from

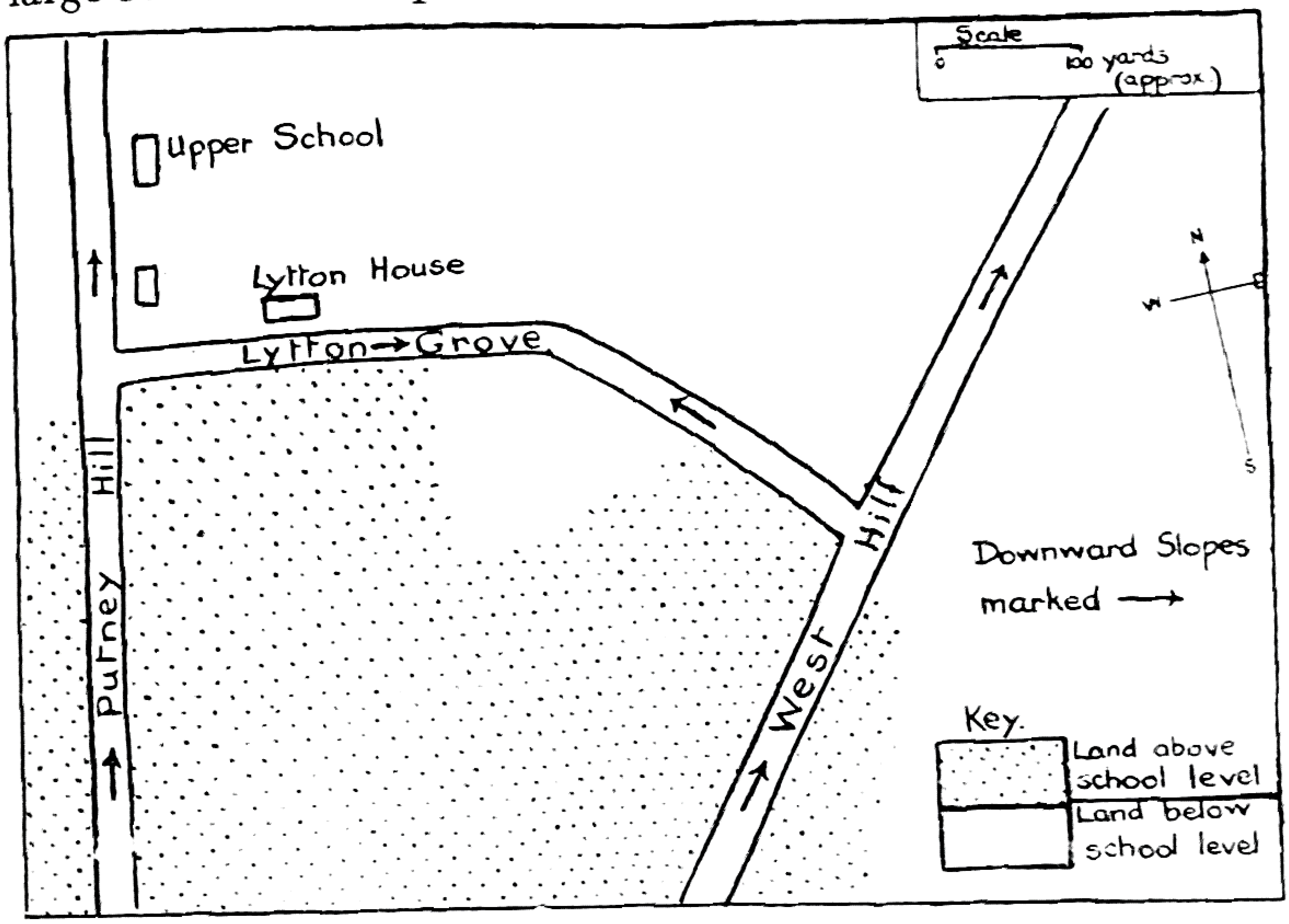


FIG. 44. EXAMPLE OF A FIRST 'LAYERED' MAP MADE BY CHILDREN IN A SCHOOL SITUATED CLOSE TO PRONOUNCED SLOPES

Children of about eight years are often capable of making a map of this kind (on a prepared outline giving the roads) with the help of a little direct observation.

direct observation. Where slopes are slight a flow of water after rain is a useful guide (see Fig. 44). A map of this kind can be understood by children of about eight plus. There are three advantages associated with it:

(i) It shows an area familiar to all members of the class, and one which can readily be visited from school for investigation or to verify details.

(ii) It leads up to the use of layer colouring to represent slopes.

(iii) It does not necessitate use of the term 'contour-line.'

There is no need for figures giving altitudes or for difficult definitions. Nevertheless the teacher will recognize that a correct conception of a contour-line is being prepared for. It is, so to speak, in the background.

In a school situated some distance from any pronounced slopes there is much less likelihood that the children will demand a means whereby they can show hills. For them any use of layer colouring could suitably be postponed until the age of eight and a half to nine. Generally, however, there is a definite need for the use of layer-coloured relief maps—of the British Isles—at about the age of nine, if not before. It is therefore advisable to carry out some map-study associated with observational work in the field, even at a distance if necessary, as early as possible.

The Approach through the Use of Relief Maps in the Field

Fig. 45 shows a typical layered relief map of a school neighbourhood. It was prepared by tracing all the necessary details from a 6" Ordnance Survey map. Copies were duplicated for the children. The children coloured their own maps, receiving sufficient guidance to ensure that from the beginning they used the conventional colours (darkest green for lowest land, etc.).

The children then planned and carried out a series of walks, taking their maps with them and consulting them frequently. The following were typical points for observation or discussion:

(i) The representation of the dip in Lytton Grove, very well known to all members of the class.

(ii) The identification of a spot at approximately the same level as the school, towards the other end of Lytton Grove.

(iii) The representation of the continuous rise up Putney Hill from Upper Richmond Road to Tibbet's Corner, going over the ground with the map.

(iv) A comparison of the representation on the map (in relation to colours or to contour-lines) of (*a*) a level road—

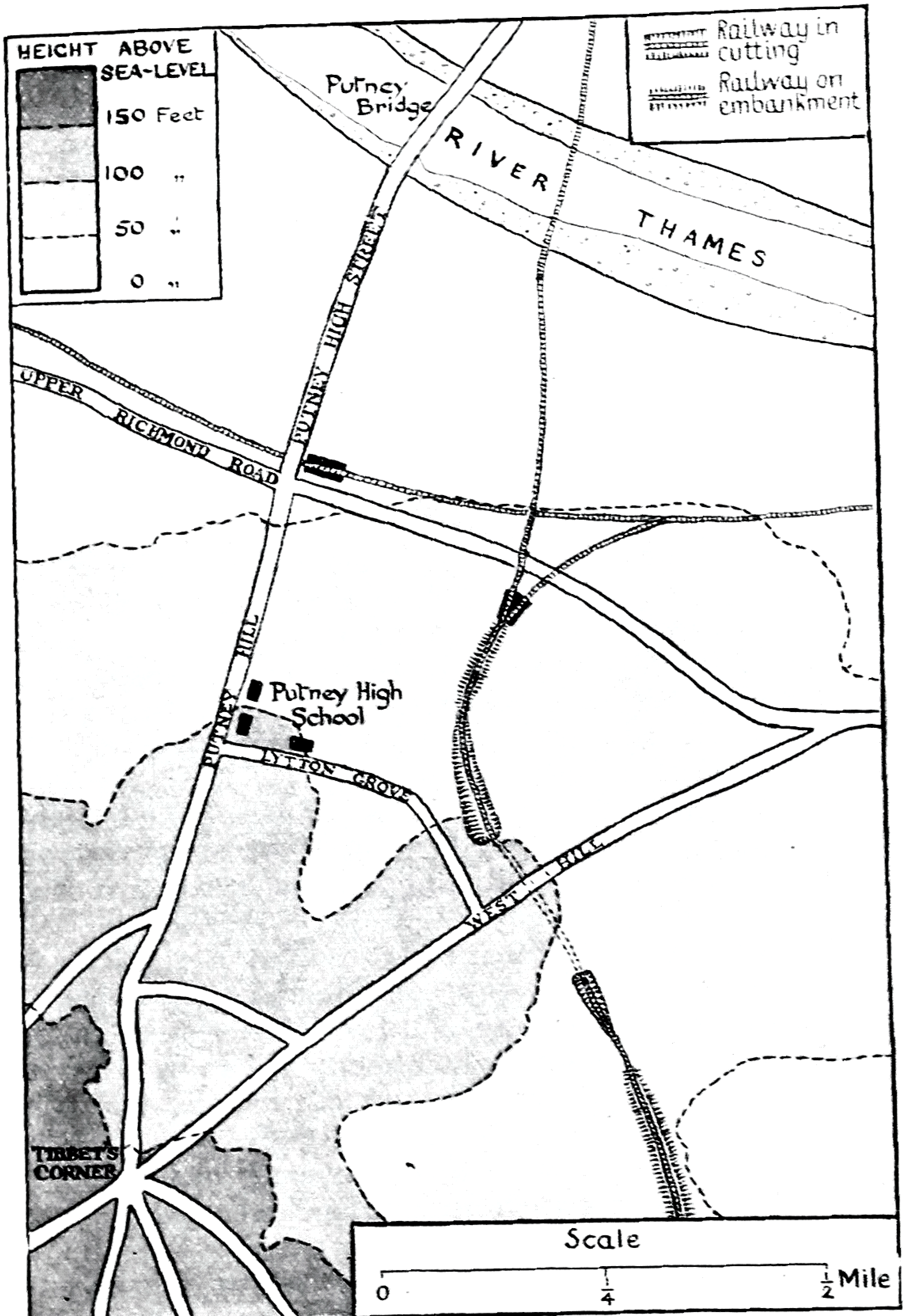


FIG. 45. EXAMPLE OF A LAYERED RELIEF MAP OF A SCHOOL NEIGHBOURHOOD

For account of its uses see pp. 250–254

Based on the 6" Ordnance Survey map, with the sanction of the Controller of H.M. Stationery Office

e.g., Upper Richmond Road—(*b*) a gently rising road—*e.g.*, West Hill—(*c*) a more steeply rising road—*e.g.*, Putney Hill —(*d*) a road that goes down and up—*e.g.*, Lytton Grove.

From such a piece of work the children should gain the following ideas concerning the layered map as a representation of the countryside:

(i) That the contour-lines and layer colours are entirely conventional. They do not in themselves represent any definite feature in the way that other symbols represent roads or buildings. There is nothing 'in the field' to indicate when we cross a contour-line or pass from one colour on the map to another.

(ii) That a contour-line is drawn to mark off all the land higher than a given level on one side from all the land that is lower than that level on the other side. For example, the 100-foot line indicates that the land on one side of it is higher and on the other side lower than 100 feet above sea-level. This conception of a contour-line is more complete and more helpful to a beginner than that conveyed by the hackneyed definition "A contour-line is a line passing through all places at the same height above sea-level."

(iii) That a given colour may represent sloping or undulating or flat ground, but not, as is sometimes imagined by children, a flat area either above or below an abrupt step which separates it from adjoining areas marked in different colours.

(iv) That minor relief features are often not indicated at all by contour-lines or layer colouring. For example, the gradients of West Hill and Putney Hill are not uniform between one contour-line and another; in Lytton Grove the amount of the drop below the 100-foot contour-line is not shown, nor is the exact locality marked where the slope changes from a 'downward' to an 'upward' inclination.

These facts become apparent to the children through the direct study with maps of a familiar area. Many of the points are brought up in the course of the work by the children's questions or remarks, but many are realized without being voiced in so many words. They are learned

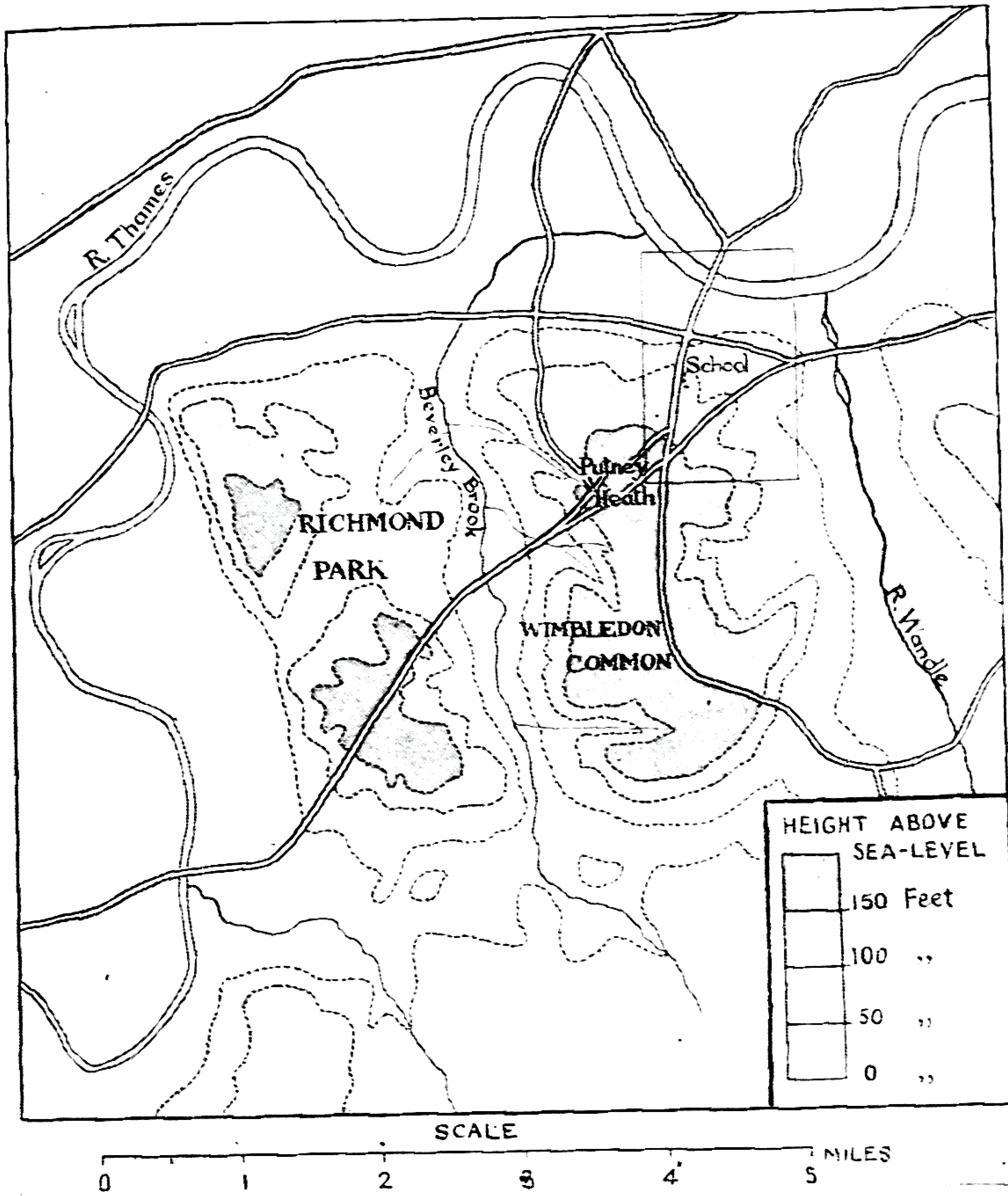


FIG. 46. EXAMPLE OF A MAP ON A SMALLER SCALE THAN THAT IN FIG. 45 TO SHOW THE AREA GIVEN IN THE LATTER IN ITS WIDER SETTING

See pp. 254–256

Based on the 1" Ordnance Survey map, with the sanction of the Controller of H.M. Stationery Office

incidentally, without much, if any, formal teaching. The fundamental value of such a piece of work is twofold. It enables the children to see layered maps as representations

of realities, not as realities in themselves, and also lays a foundation of understanding which will prove of value in later work. Nothing is learned that will have to be unlearned. (One colour does not stand for ridges and another for valleys, irrespective of altitude, as at least one authority has suggested as a possible approach to this aspect of map-work.) With slightly older children the construction of a simple section may prove interesting and helpful.

Even at this stage the relief of the area is not studied merely for its own sake. For example, without overemphasizing cause and effect it is easy to interest children in the details of the railway-line in the neighbourhood of West Hill (see Fig. 45). The need for embankment, cutting, and tunnel, to maintain an even grade when passing the spur of highland, is made quite clear in the map. An interesting comparison could also be made between the relief map and a map like that in Fig. 7. (A map which gives relief only fails to show many facts the children know about the neighbourhood. It is a good plan to show different types of feature on different maps. The children are thus helped to regard maps as adaptable instruments, and to know that a relief map is only one of many useful kinds.)

Further work with children aged about nine to ten leads to a study of a wider area with maps on smaller scales. At this stage the children can begin to read relief maps to discover facts. Incidentally, they learn more about the manner in which relief forms are represented on maps. The neighbourhood of Putney High School is seen to be part of the northern slope or flank of a plateau, whose level top is largely occupied by Wimbledon Common (see Fig. 46). This map shows features that might be studied by somewhat older children in excursions farther afield—*e.g.*, the steep slope at the western side of Richmond Park, shown by very close contour-lines; the long, wide valley of Beverley Brook, shown by parallel contour-lines; the smaller, steeper tapering valleys of the tributaries that rise on Wimbledon Common, shown by V-shaped contour-lines. Much confusion of mind and unnecessary puzzling, at least on the part of the

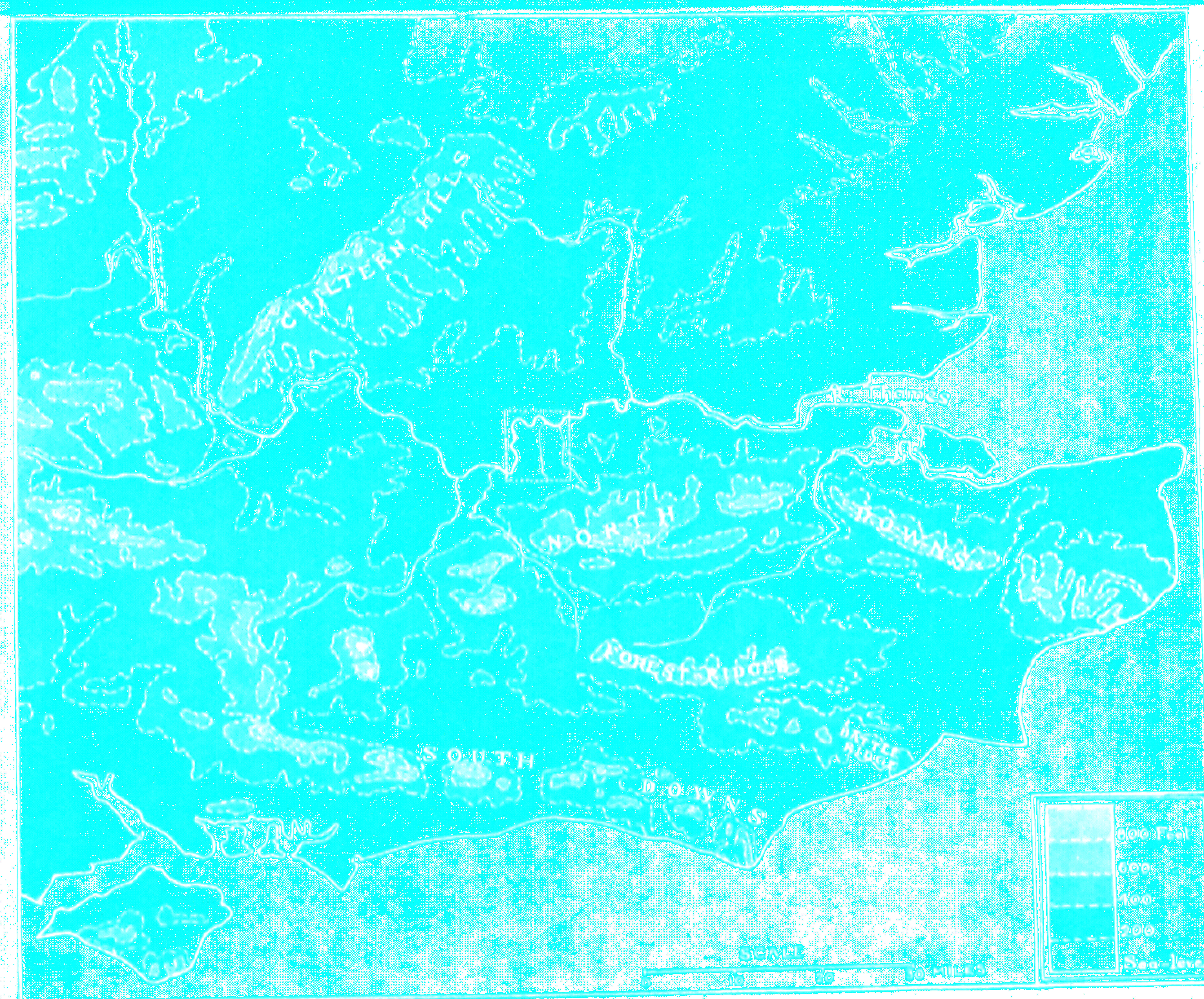


FIG. 47. RELIEF MAP OF SOUTH-EASTERN ENGLAND

slower children, is saved by the examination of a small valley in the field, with a map in the hand. The fact that the contour-lines must lie in **V**-shapes pointing upstream becomes obvious. It does not require to be learned parrot-wise, as a 'tag' to be used without understanding. At this point it is valuable for the children to make a layered model to represent the valley they have visited—*i.e.*, to express their knowledge of its characteristics in the form of a model as well as of a map.

Proceeding from such maps as those in Figs. 45 and 46 to maps on smaller scales, like that in Fig. 47, the local area is viewed in wider perspective. In the example under consideration the local plateau is seen as a tiny fragment, not of upland, as hitherto, but of a greater lowland area, within what is known as the London Basin. The size and altitude of the local upland is negligible in comparison with that of the North Downs. A child who has carried out a piece of work of this kind should not in later work assume that land coloured green in an atlas-map is necessarily flat.

The Interpolation of Form Lines. With children younger than ten years at least the emphasis is placed more on the layer colouring than on the contour-lines as a means of representing relief. Children of eleven years and older can discover a great deal more about the use of contour-lines as such, and should ultimately be able to read uncoloured topographical maps of this and other countries.

The best way to prepare for this more advanced work is for the children to make their own more detailed contour maps of familiar areas. This can be done by the interpolation of form lines—*i.e.*, lines which suggest contours, but which have not been surveyed in detail—with reference to spot-heights and bench-marks. For many years it has been a common practice to give children exercises in contour-drawing, but for these exercises the data supplied generally concern unknown or even imaginary pieces of country. Such exercises are certainly useful, but they should be introduced only after the contouring of a familiar area has been carried out by the children. Fig. 48 shows an example of form-line

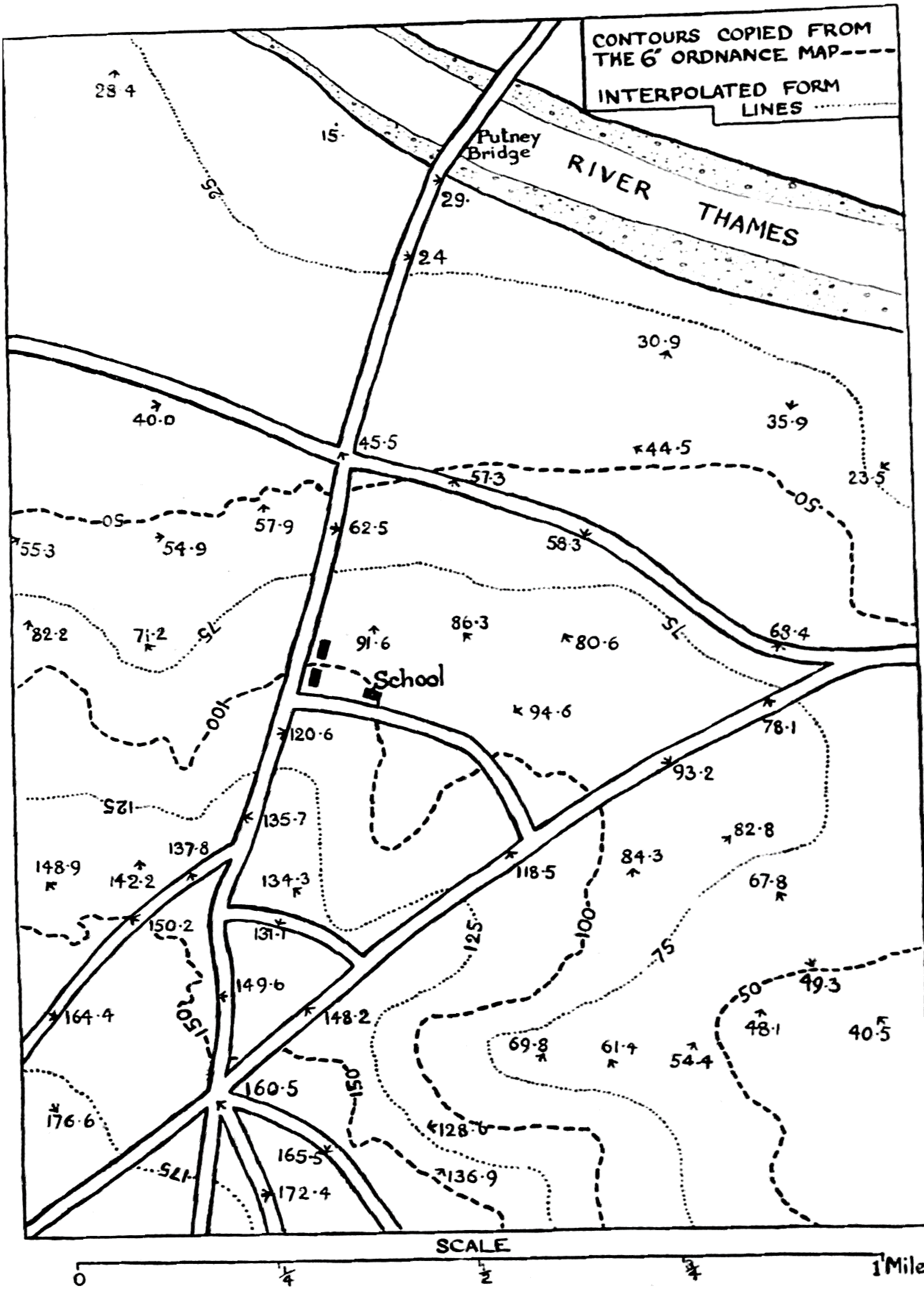


FIG. 48. EXAMPLE OF A CONTOUR EXERCISE USING ALTITUDES OBTAINED FROM BENCH-MARKS ON THE 6" ORDNANCE SURVEY MAP

The bench-marks can be referred to in the field where necessary.

Based upon the Ordnance Survey map, with the sanction of the Controller of H.M. Stationery Office

interpolation in a map of the school neighbourhood. Apart from any other advantages, the fact that the work is concerned with local features enables the children to investigate doubtful points and to clear up difficulties by observation on the spot. The bench-marks should be noticed and referred to in the field. The bench-mark symbol is generally chiselled on kerbstones or walls. It marks the exact spot whose altitude has been accurately measured by surveyors, and the position of which is shown by a similar mark on the 6" map. (For other details in this connexion see the books mentioned at p. 268.)

A piece of ground in which bench-marks are too few for approximate form lines to be suggested is sometimes found, even in urban areas, where bench-marks are more numerous than in rural districts. The necessary spot-heights would then have to be supplied by simple survey-work. Elementary surveying of this kind is described in several books (see bibliography). It fulfils another purpose in giving the children some conception of the methods by which data for maps are obtained. The children themselves generally bring up the question as to *how* the altitudes of the bench-marks were discovered, and there can be no better way of explaining this than by carrying out a piece of levelling, even with home-made apparatus, provided that the children are aware of the comparative crudeness of their own work. It must be remembered, however, that surveying is more appropriately recognized as work in mathematics.

III. The Approach through the Contouring of Depths below Water

The difficulty sometimes occurs in finding a sufficiently obvious level to which altitudes can be related or from which they can be measured, either actually or in imagination.[1] In this connexion a method has been suggested which provides a helpful preliminary or supplementary activity, though it cannot replace the work with large-scale maps

[1] *Cf.* J. Fairgrieve, *op. cit.*, pp. 155–158.

described above. The children make a contoured map to show the depths of water in a pond. For the pond to be a real one, on which actual soundings are carried out, is an advantage, but by no means a necessity. In fact, children who are too young to do the survey-work associated with lines of soundings can readily imagine a pond in which children may paddle. It may be supposed that a number of children of the same size wade into the water from different points, and stop when the water just covers their ankles (or when six inches or one foot of a plumb-line can be submerged). Spot-heights showing the positions of the children are marked in a map of the pond. When these spots are joined by a line that line marks off roughly all the water that is shallower from all the water that is deeper than ankle-depth (or six inches or one foot, as the case may be). If all the children wade in farther, till the water touches their knees, another line could be drawn, marking off all the water that is suitable for paddling from that which is too deep, and so on. It should be noticed that the emphasis is laid not on the line for its own sake, but on the deeper and shallower water (*cf.* p. 252). The map should be layer-coloured in shades of blue, the conventional colour for water, with the darkest blue for the deepest water.

This method has a threefold advantage: (*a*) it allows easy reference to a level as a base from which to measure and which is present in all parts of the pond; (*b*) it deals with a situation that any child finds easy to imagine; (*c*) it keeps close enough in principle to the method by which layered maps showing depths of water are made.

By means of preliminary work of this kind it is possible to convey to the children those points concerning contour-lines and layer colouring that need to be grasped at the beginning. The very doubts that are felt about the arbitrary drawing of the line in a given position are of value.

The contouring of a pond may suitably be followed by studying a map of a real lake, but the work with under-water depths is in any case only a preliminary for work with land elevations. With normally intelligent children it is usually

possible to pass directly from a study of these maps to a study of a simple layered relief map of hill-country by the sea, especially if it can be examined in conjunction with pictures of the same area. Following this a relief map of the country round the lake is of interest; but it is better

FIG. 49. GREAT GABLE FROM THE SHORE OF WASTWATER

Figs. 49 and 50. A simple example to illustrate the relating of a picture to a large-scale relief map. The simplicity of this exercise makes it suitable as a first step. It emphasizes the effect of perspective and foreshortening, and suggests the use of *lines of sight*. (See also Fig. 51.)

Photo G. P. Abraham, Ltd., Keswick

taken after a map which includes the sea, because the lake surface is higher than sea-level, and the land contours are related to sea-level, not lake-level.

A point that deserves emphasis here is the fact that in approaching a new subject there is often everything to be gained if the children plunge directly into a study of the real thing as soon as they possess an adequate knowledge of the rudiments necessary to make any study of it at all.

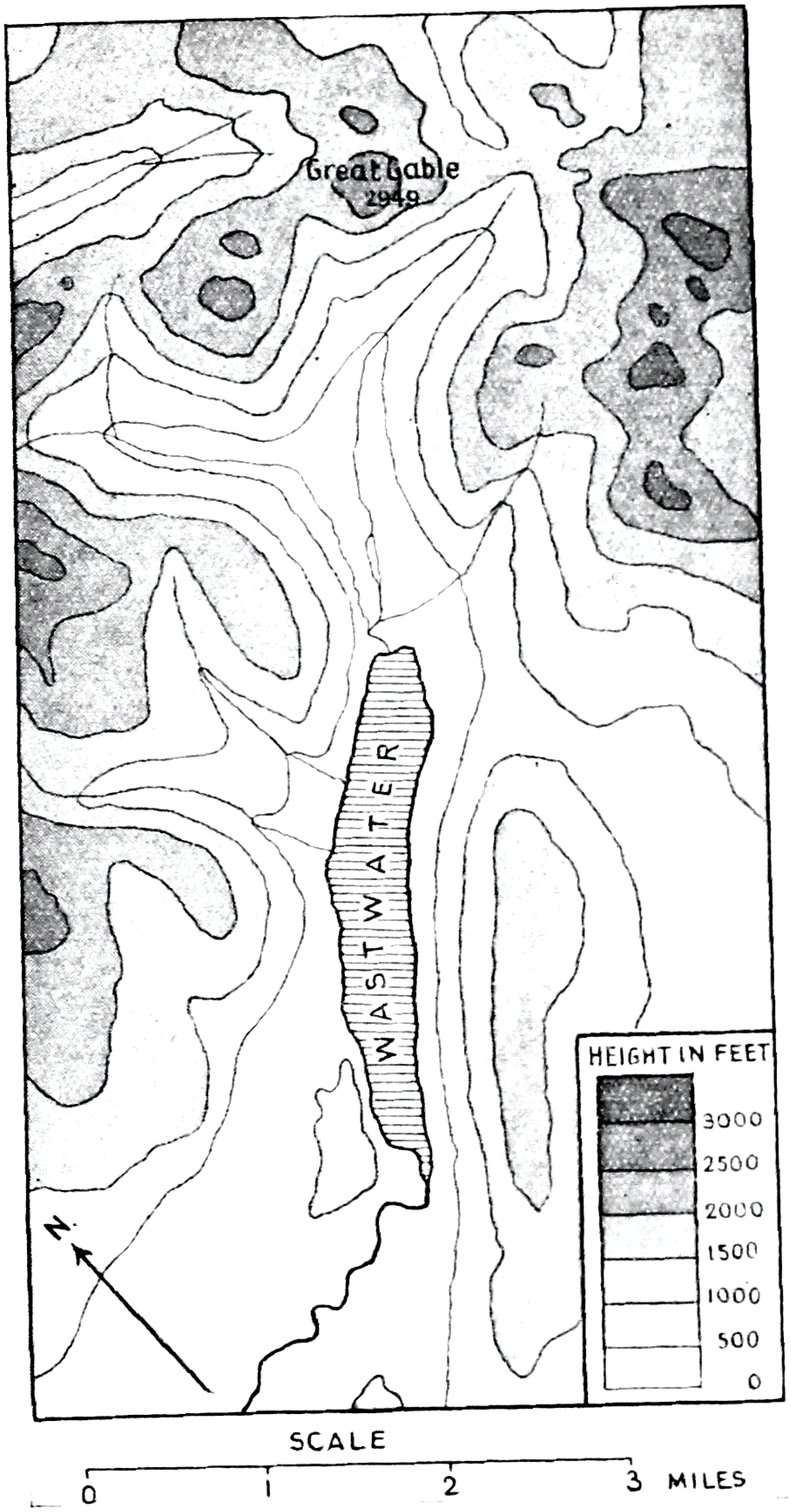


FIG. 50. RELIEF MAP SHOWING WASTWATER AND GREAT GABLE

See note under Fig. 49 on opposite page.

Based on the Ordnance Survey map, with the sanction of the Controller of H.M. Stationery Office

In this case, provided the foundation-work has been well grasped, intelligent children of nine to ten can readily use such maps as those in Figs. 45, 46, and 50. It seems artificial to suggest, as one authority does, that they should first make a map of a hill out of their map of the pond by changing the contour numbers. A map of a real hill, especially if it can be accompanied by pictures of the hill or, better still, if it represents a hill that can be visited, is far more interesting and equally intelligible. It is clear that at this point local work with 6″ and 1″ maps (as described under II above) should be included.

It is possible to use one or all of the last three methods in a comprehensive course, the aim being to lead up to the point when the children have sufficient understanding to interpret layered or contoured maps of regions they have never seen. When this stage is reached much valuable work can be done in relating pictures to maps. A simple example is given in Figs. 49, 50, and 51. The special value of work of this kind is:

(i) It provides a substitute for experience—*e.g.*, for children who have never visited a highland area.

(ii) It prepares children to realize the intricate structure of a mountain region, which in atlas-maps is represented merely by a patch of brown. Children should have opportunities to compare a map such as that in Fig. 50 with one like that in Fig. 52, and both should be compared with representations of the area concerned on an atlas-map of the British Isles, as in Fig. 53. If work of this kind is followed by similar work with regions of yet higher and more complicated relief (*e.g.*, the Swiss Alps) a great deal should be done towards making clear the deficiencies of atlas relief maps. The children should realize the extreme simplification embodied in the patch of brown which marks the Alps on a map of Europe.

The studies suggested above have for their object not only the understanding of relief maps; the aim is also to give true conceptions of all kinds of relief features—mountain-

FIG. 51. WASTWATER FROM THE SUMMIT OF GREAT GABLE

Cf. Figs. 49 and 50, and see p. 264.

Photo G. P. Abraham, Ltd., Keswick

ranges, peaks, valleys, etc. To take one example briefly: for many children the term 'mountain' signifies an isolated, somewhat conical or pyramidal peak rising from more or less level country. It seems that this idea originates from pictures—*e.g.*, of the Matterhorn—found in many schools, which, by failing to show the mountain in its setting, give to a child a false impression of its isolation. Pictures which show the mountain as part of a range and the fact that it must be approached by forested and grassclad slopes, for example, should accompany the other. Yet there is undoubtedly a need for close views of mountain-summits. For example, the fragment of the summit of Great Gable shown in Fig. 51 could be made enlightening to a child who has assumed a smoothness—*e.g.*, as of the Downs—from the picture in Fig. 49. Studies of the accounts of recent climbing expeditions—*e.g.*, in the Himalayas—are valuable as a part of school-work, if for no other reason than the enlightenment they give concerning details of mountainous countries, the variety of surface conditions, and the complexity of mountain-ranges. (*Cf.* p. 280.)

Relief Models

An Activity for Handwork related to the Above Course

Many relief models—even those exhibited in some museums—give a grossly exaggerated idea of mountain heights. Slopes are generally far too steep. In some schools the children make relief models of continents, and where this is not done with great care it is liable to create wrong impressions, because the children remember so clearly the model they have made. It is not uncommon to see the Alps or the Himalayas represented by a single roll of plasticine!

Probably the making of relief models is best limited, at least with junior-school children, to those of familiar areas. The following is a method suitable for children of about eleven or older, by which an accurate relief model can be made, using materials easy to obtain and to manipulate.

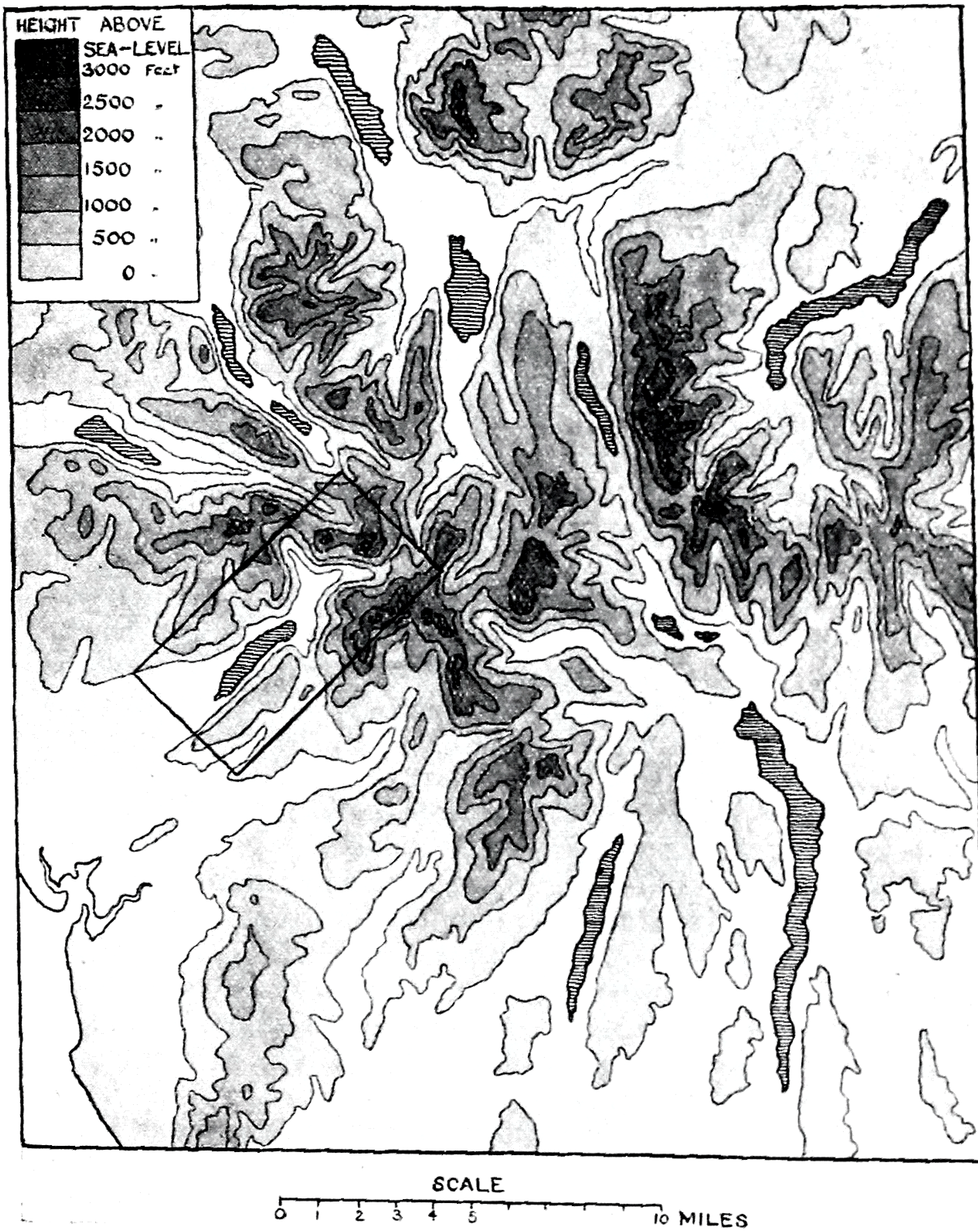


FIG. 52. MAP OF THE LAKE DISTRICT

Showing (i) the position of the area included in Fig. 50; (ii) the intricacies of the relief which a child's atlas-map fails to convey. (*Cf.* Fig. 53.)
Lakes are shown by horizontal shading.

Method of making a Large-scale Relief Model

Materials required :

- 6″ or other Ordnance Survey map.
- A large sheet of stout strawboard $\frac{1}{4}$″ thick.
- A wooden base on to which the above may be screwed.
- Thin strawboard of uniform thickness.
- Plasticine, vaseline or oil, glue, cellulose paint, oil-paint in required colours.

The stout strawboard is screwed on to the wooden base to make a smooth and firm foundation. The surface of the strawboard represents sea-level.

From the Ordnance map each contour-line is traced, and the shape enclosed by it is cut out in the thin strawboard and glued into position. One or more thicknesses of thin strawboard may be necessary for each vertical interval, according to the scale of the map, the slopes to be shown, etc. The vertical scale should be calculated from the thickness of the strawboard—for example, a rise of 50 feet may be represented by $\frac{1}{8}$″, in which case the vertical scale would be 400′ to 1″. If the horizontal scale is 6″ to 1 mile this means that the vertical exaggeration is slight. Usually, however, it has to be greater if the slopes are to be clearly shown, but it should be kept as low as possible, and should in any case be clearly stated on the finished model.

When the contour shapes are all glued into position (sometimes a few screws are also helpful) the steps between the contour-lines are filled in with plasticine, which is smoothed down so that the top outside edge of each strawboard shape just touches the surface and marks the contour-line. A smooth surface is easily made with the help of a trace of oil applied with the fingers.

For painting the plasticine surface cellulose paint must be used in the first instance on account of the oil in the plasticine. After a coat of white cellulose paint any colours in oil-paint can be used as desired.

Note. Of all materials with which experiment has been

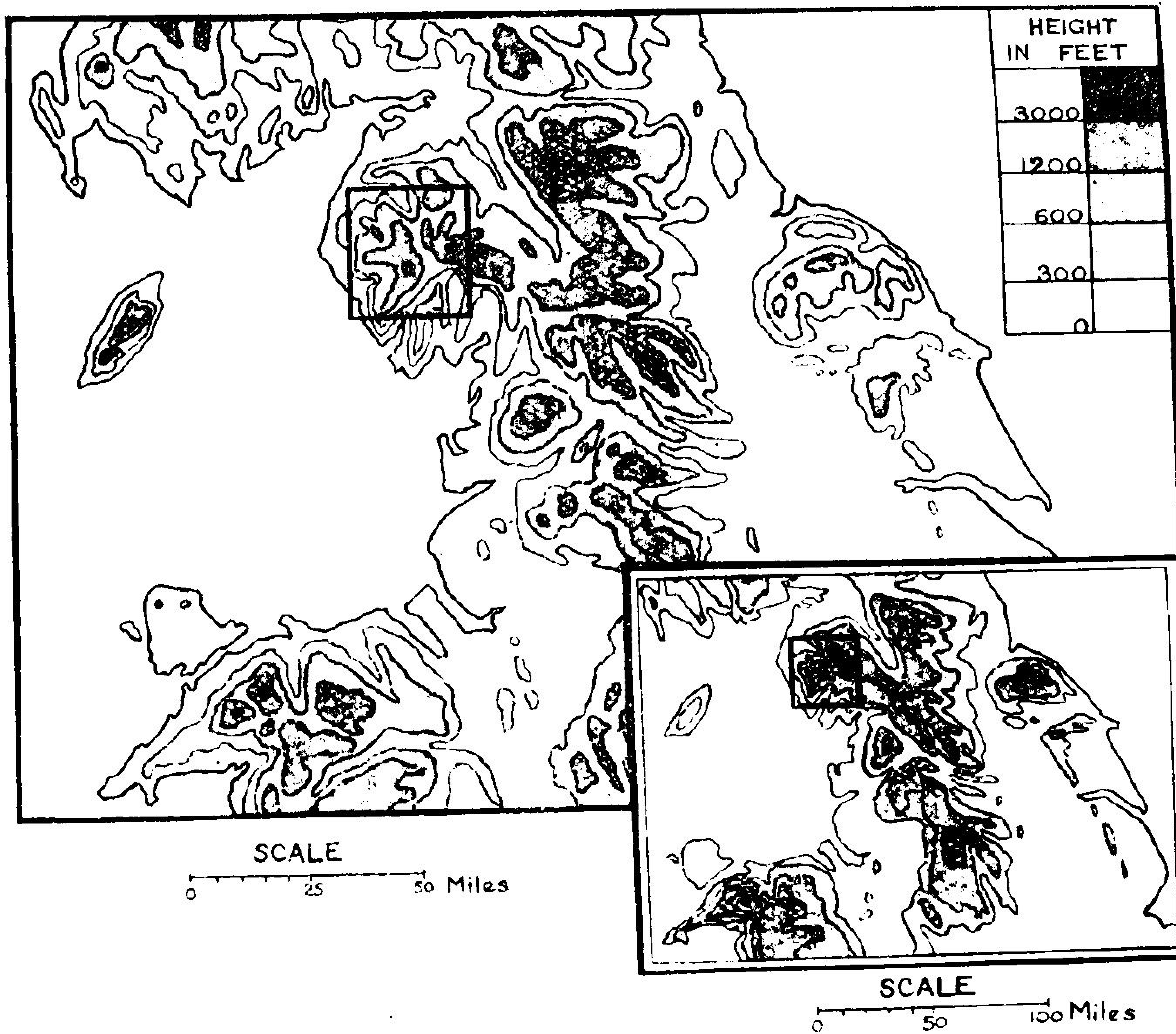


FIG. 53. MAPS SHOWING HOW THE LAKE DISTRICT IS REPRESENTED ON MAPS OF ENGLAND AND OF THE BRITISH ISLES IN A TYPICAL CHILD'S ATLAS

The small scale necessitates much simplification of the relief features. The area enclosed by a rectangle is shown on a larger scale in Fig. 52.

made plasticine seems to be by far the most satisfactory for this purpose. It is probably an advantage if the strawboard is sized before the plasticine is put on. The main drawback in the use of plasticine is that the surface of the finished model is not hard. It should be possible to make a harder surface by pasting several layers of tissue-paper (torn into very small fragments) over the plasticine, but this method is probably not to be recommended for children. In any case, the value for children lies more in the *making* of the model than in the finished product.

SOME USEFUL BOOKS

CARTER, C. C.: *Land Forms and Life* (Christophers, 1932).

FAIRGRIEVE, J.: *Geography in School*, Chapter XII (University of London Press, 1953).

GARNETT, A.: *The Geographical Interpretation of Topographical Maps*, Chapter II (Harrap, 1930).

SANDERS, E. M.: *Geography from the Air* (Nelson).

WOOD, M.: *Map-reading for Schools* (Harrap, 1950).

GREITZER, S. L.: *Elementary Topography and Map Reading* (McGraw Hill, 1944).

SYLVESTER, D.: *Map and Landscape* (Philip, 1953).

See also book-list on p. 328.

The relation of contour maps to photographs is exemplified in GULLICK, C. F. W. R.: *A Pictorial Survey of England and Wales*: Section I: "The Oxford Region" (Philip, 1939), and in a simple way, suitable for junior school children, in GARNETT, O.: *Finding Out* (Blackwell, 1951).

T. W. BIRCH, "Constructive and Creative Work in Geography," in *Geography*, March 1943, gives various methods of making relief models, suitable mainly for children of secondary-school age.

For children's study, and suggestions for their practical and outdoor work, see "The Discovery Books," *Book II. Finding Out* (Blackwell, 1951); especially pages 47–51 and 68–97.

CHAPTER XI

EXAMPLES OF STUDIES BY CHILDREN AGED TEN TO TWELVE PLUS AND SOME OF THE PRINCIPLES INVOLVED

THE purpose of this chapter is twofold. It attempts to show (i) further types of geographical study suitable for children from the age of about ten to twelve plus; (ii) the application of various modern teaching methods which demand that the work shall be the children's own.

EXAMPLE I. THE BRITISH ISLES: AN APPROACH THROUGH ROCK-STUDY

A number of reasons seems to suggest that at about the age of eleven (earlier or later according to their stage of advancement) children should make a geographical study of their own country intermediate in scope between that suggested for children aged about eight (*e.g.*, "Workers in Britain") and that which is made nearer the end of the school career (often for examination purposes). It is fitting that the more advanced type of geography of which children from the age of about ten onward are becoming capable should be approached through a study of the country of which their experience is richest. In schools not situated in very poor districts the majority of children of this age have travelled to a few places outside their home neighbourhood, and can retain impressions of things seen with some degree of perspective. Helped by a little suggestion, these children can undertake independent observational work on their holidays (and some on week-end excursions), particularly if local geography studied from school has given them a little inspiration and training. Opportunities, and the use made of them, vary with individuals, but the collected

experiences of the class generally offer a great deal that is valuable if suitably used.

The following account describes very briefly a year's work taken with several classes of boys and girls aged ten to eleven plus in a London school. It should be regarded merely as one of many lines of study that could originate in similar ways. The course is begun in the autumn term, when the children return from summer holidays, spent in many cases on the coast. The suggestion has sometimes been made beforehand that those who can do so should bring back fragments of rock (from cliffs, etc.), seashore pebbles, snapshots or postcards to show interesting features (*e.g.*, headlands, coves, harbours, etc.), and also any interesting information they can gather about the countryside, the work of the people, and other matters.

Sometimes the information collected can be pooled by short 'lectures' in which the pictures are shown, with descriptions or explanations by each observer. In several classes the main line of interest evolved has had to do with rocks. Children and teacher sometimes co-operate in the making of a class museum, in which each specimen is labelled to show its place of origin and its name (sandstone, shale, etc.). Many rock specimens cannot be identified at once, and it is necessary for the teacher to set an example of scientific caution. (Reference can always be made to the Geological Museum, London.)

Observations, picture-study, etc., inevitably give rise to many questions, to be answered both by the 'observers' and the teacher. Typical questions are:

(*a*) Why is it that some seaside places have cliffs and some places have not?

(*b*) Why are cliffs made of different kinds of rock (sandstone at Hastings, chalk at Broadstairs and Beachy Head, slate at Ilfracombe, clay at Frinton)?

(*c*) What are rocks made of? What exactly is chalk, etc.?

(*d*) Where do the stones come from that make the shingle?

In the following lessons these questions are pursued. The

children come to realize that there are rocks of one kind or another everywhere under the soil; that in a cliff or railway-cutting, gravel-pit or quarry, the earth's surface is cut open so that we can see what it is like under its cover of vegetation or of streets and houses. By examining and comparing gravel, grit, sandstone, clay, shale, etc., and by carrying out a little experimental work, the children understand that these were deposited by water rapidly or gently flowing or still, and that some have subsequently become hardened. They examine pieces of chalk and limestone, see some common fossils embedded in them, and possibly follow this up in their nature lessons—*e.g.*, by observing *Foraminifera* under the microscope, or by finding out how an ammonite differs from a snail. They realize that rocks were mostly deposited in layers horizontally. Some of the cliffs show horizontal bedding (observed and revealed in pictures). In others it is clear that the layers have become tilted. The children quickly grasp that some rocks are more resistant than others, and understand how it is that the clay cliffs of East Anglia are low and crumbling, that the chalk ridges run out to sea as cliff-bordered headlands. This involves some discussion concerning the nature of wave-attack. Children who have paddled when the tide is high generally know a good deal about the power of waves to move stones. It is easy to apply this in explaining the horizontal undercutting effected by waves that can wield much larger stones in times of storm.

To answer the children's questions about detailed features of a cliff-face, of stacks and caves, of rocks on the foreshore, it is generally necessary to show them that in many rocks there are great lines of weakness or cracks (joints), often running parallel to one another and cutting across the bedding-planes; that along these lines of weakness erosion by waves or weather is relatively quick. This knowledge appears 'advanced,' but in reality it is quite simple. Those who possess it can readily understand the curious geometrical forms assumed by caves, crags, rock pinnacles, and even rock pools.

A new stage is reached when the children are led to turn their attention inland. The features of a piece of coastline are seen to be related to the nature of the land-mass which there meets the sea. A promontory may terminate a hill-ridge, an inlet be the drowned end of a valley. (It may not come amiss here to point out that inlets are seldom the work of the sea alone. A coastline showing much indentation—*e.g.*, that of Western Scotland—probably owes this characteristic largely to the surface features and structure of the land-mass. Wave-attack is likely to be concentrated on headlands and deposition to take place in bays. Children who have visited certain parts of Devonshire know that sandy beaches are to be found only within the coves.) A simple geological map (*e.g.*, Fig. 54) shows how bands of chalk run inland from the chalk headlands. London children are quick to connect this with their experiences of the chalk hills—*e.g.*, in the Downs, Chilterns, etc.

The children should also investigate the rocks of the school neighbourhood, if they have not done so previously. A pit dug in the school garden in London may expose either the London Clay or one of the gravel deposits above it, possibly even both. If this is impracticable it is generally easy to find excavations in process or foundations being dug not too far away. One boy of eleven, digging in his own garden, found clay in one part and gravel in another. He was not satisfied till an explanation was offered, and this entailed giving him an idea of the flood-plain gravels, deposited over the London Clay by a former Thames, and now partially removed. His questions also called for an explanation of river-terraces, since he wanted to know how the gravels could be so high above the present Thames.

Most of the deep foundations in London pass down into the London Clay. Children invariably want to know, "How did the clay come to be there?" and "What would you come to under the clay?" One class was not content with a rough diagram in answer to the latter question. Their teacher had to obtain, at the Library of the Geological Museum, figures showing the actual details of a boring for a well made in the

school neighbourhood down to the base of the chalk. From these a diagram was constructed to scale.

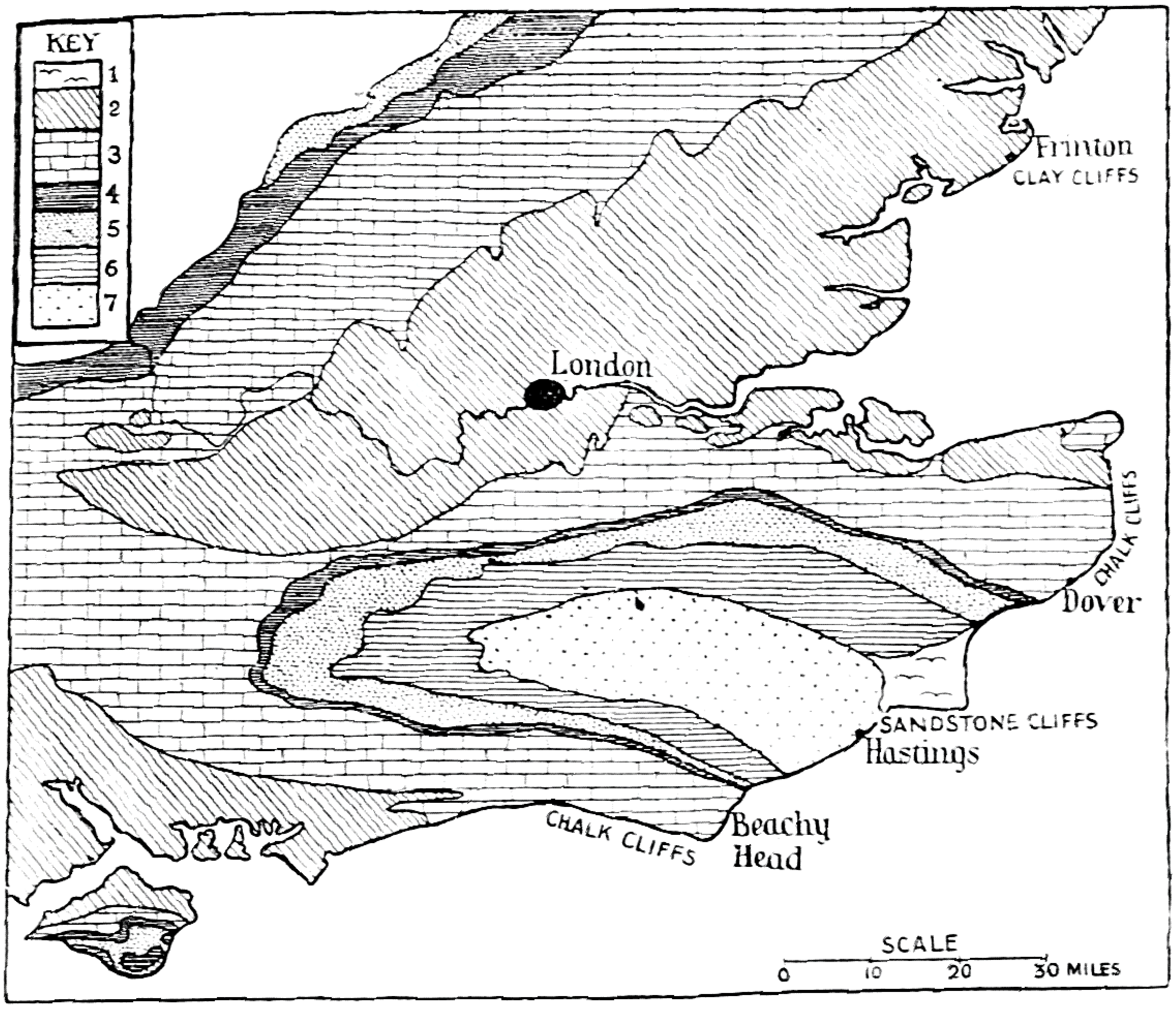


FIG. 54. A GREATLY SIMPLIFIED GEOLOGICAL MAP OF SOUTH-EASTERN ENGLAND SUITABLE FOR USE WITH CHILDREN IN CONNEXION WITH THE WORK DESCRIBED IN EXAMPLE (1)

See pp. 269–276

Key (for children)	*Actual Geological Formations*
(1) Shingle, sand, etc.	Quaternary deposits
(2) Clay with gravels, sand, etc.	London Clay, and other Tertiary deposits, with overlying Quaternary gravels, etc.
(3) Chalk	Chalk
(4) Clay	Gault Clay (and Upper Greensand
(5) Sandstone	Lower Greensand
(6) Clay	Weald Clay
(7) Sandstone	Hastings Sand, etc.

This map should be compared with that in Fig. 47

The knowledge that the chalk lies below the London Clay in the London area, and that it appears at the surface in the Chilterns, to the north, and in the North Downs, to the south,

led another boy, aged ten, to remark, "It is rather like a basin, isn't it?" This remark is interesting in two ways: one because the child had hit upon the actual geological term 'London Basin,' and the other because the extremely metaphorical use of the word *basin* was quite apparent to him. The lesson did not begin by teaching "The London Basin" (a downfold or syncline of chalk, partly filled with London Clay, etc.). Such an approach would have been so remote from things as they know them that it could have held little interest for the children. The word 'basin' (*cf.* p. 160) was applied only after the children had built up a clear image of the structure in their minds, in this case by following their own inquiries. Almost immediately a girl said, "You could make a model of it, couldn't you?"—a suggestion which the class promptly took up. And forthwith, in spite of a certain lukewarmness on the part of the teacher, the model was planned and made (not once, but three times, before it satisfied the children).

In another direction the work is followed up by studies of soil. Weathering and some aspects of soil-formation are discussed briefly in geography, but it has been necessary to make arrangements for the children's general science course to include studies of soil, its constituents, and the properties of some of these. During the winter term the work may be concerned with the part played by rocks directly and indirectly in human and economic geography.

Suitable topics for study are: coal, coal-mining, uses of coal; iron-ore, iron-smelting, steel, etc.; clays, pottery, brick-making, etc.; slate and other building-stones, road-metals, and quarry-workings; cement (made from chalk and clay), etc.

In the summer term, when outdoor observation is easier, the work may deal with the effect of various rock-types on the characteristics of the countryside—*e.g.*, on surface features, natural vegetation, types of farming, materials used in old buildings, etc. The studies are in no way exhaustive, and depend largely on opportunities and the direction taken by children's interests. For example, a visit made to the Leith

questions raised are the most profitable to pursue. (Some are inevitably beyond the children's capacity.)

(*c*) In keeping a certain amount of balance within the work on hand, and between it and other work. For example, the teacher must see that important factors other than soil—*e.g.*, climatic conditions, access to markets, etc.—receive due attention in studies connected with agriculture and other forms of land utilization. It is sometimes necessary to bring forward lines of study which the children would not perceive without suggestion, but which introduce a certain amount of system, or which carry forward the application of the work. For example, the teacher might draw attention to the position of a farm, a village, or a town situated near the meeting of two or more rock-types, and therefore within easy access of a variety of products, agricultural and other.

(iii) The work deals with actualities. It is clearly related to life in the world and to the children's life in particular. Also it has a social value—*e.g.*, in pooling experiences.

(iv) It provides suitable background knowledge for more advanced work. For example, when these children are reading for School Certificate 'sandstone,' 'limestone,' etc., will not be mere text-book words.

(v) The children's appetite for knowledge is encouraged. They acquire a reverence for learning and an appreciation of 'how much more there is to know.'

(vi) The work fulfils one of the aims of education, in that it provides an interest likely to remain for life. When one knows something about the rocks and structure of a piece of country the changing landscape on a journey, the varying materials used in ancient buildings, take on a richer significance. Much of our English literature can be better appreciated in the light of a little earth knowledge.

(vii) The topic 'rocks' makes a strong appeal to children, not *only* because it lends itself to their habit of collecting. To any teacher who has attempted work of this kind it becomes clear that rock-study has a definite place in the education of boys and girls, and neglect of it should be remedied.

about which the children knew something, made less impression on them than topics of a more concrete nature, such as the draining of a sea or the building of a bridge. From their work it was clear that all had gained new knowledge of a geographical character about countries and places hitherto unknown to most of them. It goes without saying that geography was only one of several subjects served by this lesson.

It must be admitted, however, that the content of the lesson lacked unity, consisting as it did of several isolated topics. Some teachers would criticize this, but others would agree that a lack of coherence is legitimate in a lesson when the reason for its absence is obvious to the class. While recognizing the fact that school-work must give training in keeping to a line of thought, a central idea, etc., teachers sometimes forget that it is normal and natural for children (and adults also) to collect odd items of knowledge which the mind ultimately sorts out for itself. Actually a lesson of the kind indicated may give training in classifying and relating, for it frequently happens that current events have reference to subjects recently studied or actually on hand. To recall the knowledge gained last term about Holland or India, for example, and to relate a new piece of information to it, is excellent educationally. Among other reasons is the fact that the knowledge gained in previous school-work proves its value, in that without it the current event would not be so well understood. For example, present-day exploration in Antarctica holds special interest for children who have been studying the work of earlier explorers, and the course of a new long-distance flight is readily appreciated by those who have been measuring distances on the globe (see page 109).

Another objection that might be raised is that the normal course of study is interfered with by the introduction of irrelevant matter. The decision as to this depends on relative values at any given moment. Children should certainly be trained to keep to the work on hand, but in addition should be encouraged in the openness and elasticity of mind which

or use of a pass. Nevertheless, if selected carefully and with an end in view, it is possible to use narrative of this kind in geographical teaching. Moreover, the photographs published in the Press are sometimes of great interest geographically. For example, one full-page air photograph from *The Times* showing the Everest range appearing above a wall of cloud, with the plains of Bihar in the foreground, was studied voluntarily by a class of children (aged nine and a half to ten and a half) for the greater part of a lesson. Their questions led to discussions concerning matters of relief, cloud-limits, the snow-line, visibility, the course of a river, the appearance of the cultivated plains of Hindustan, etc.

The attempts[1] to climb Mount Everest and the flight over the summit were followed with close attention from week to week by many children. From them the children gained useful knowledge concerning the characteristics of high mountain-ranges, and about the Himalayas in particular. The following facts stood out, because they determined or conditioned many of the incidents described in the narratives: (*a*) The heat and dustiness of the plains of Hindustan in March and April; (*b*) the approach to the higher mountains through ranges of foothills; (*c*) the existence of forest-covering on lower slopes and foothills; (*d*) the changes of climatic and vegetation conditions as ascent is made; (*e*) transportation problems associated with the different areas traversed; (*f*) the nature of mountain surface in some detail—precipices, screes, and other difficulties in the way of path-making; (*g*) general atmospheric and weather conditions associated with high altitudes—*e.g.*, strong winds, blizzards, mist and cloud, rarefied air, frost, snow, ice, avalanches, etc.

For the children who made this study the terms 'mountain,' 'mountain barrier,' 'inaccessibility,' 'altitude,' etc., will probably always hold a wealth of meaning.

[1] This was written long before the successful expedition of 1952–53, which is likely to continue as a source of interest to children. Junior school children can now read the account for themselves in Sir John Hunt's *The Ascent of Everest: Retold for Younger Readers* (University of London Press, 1954).

FIG. 55. EXAMPLE OF A TYPE OF NATURAL OBSTACLE FREQUENTLY FOUND IN MOUNTAIN REGIONS

The Sjolander Cut (part of the Kootenay–Proctor line of the C.P.R.) in process of construction. Here the railway has to be carried along a lake shore where the mountain-wall drops sheer down to the water's edge. This photograph shows how the track is made by cutting out a ledge in some places and building up a wall of masonry in others. In places where rock-masses project farther out towards the lake they are pierced by tunnels.

Photograph by courtesy of the Canadian Pacific Railway

Example IV. The Use of a Common Interest (Engineering) in approaching a Study of Relief and other Geographical Features in a Continent

There are also several subjects of a more general character which hold interest for the majority of children, some of

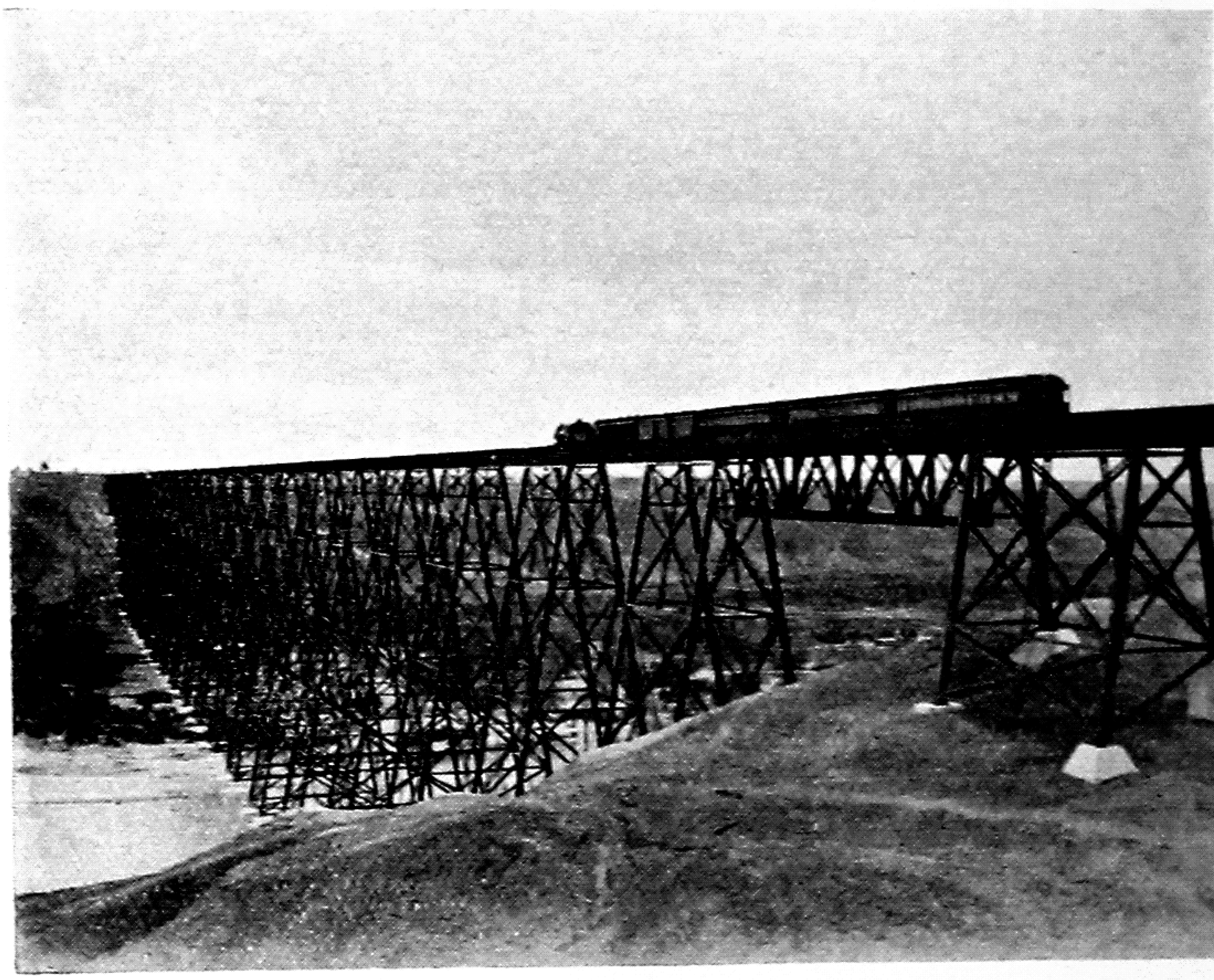


Fig. 56. Where a Wide River-valley is an Obstacle

Lethbridge Viaduct, by which the railway crosses a valley deeply trenched in the plateau country of Alberta.

Photograph by courtesy of the Canadian Pacific Railway

them varying according to the children's age and sex. For example, it was quite characteristic when the boys in a class aged ten and a half to eleven and a half showed enthusiasm for any topic that had to do with engineering. The geography syllabus prearranged for that year decreed that the children should learn about the Americas. It seemed possible to satisfy both the children's interests and the dictates of the

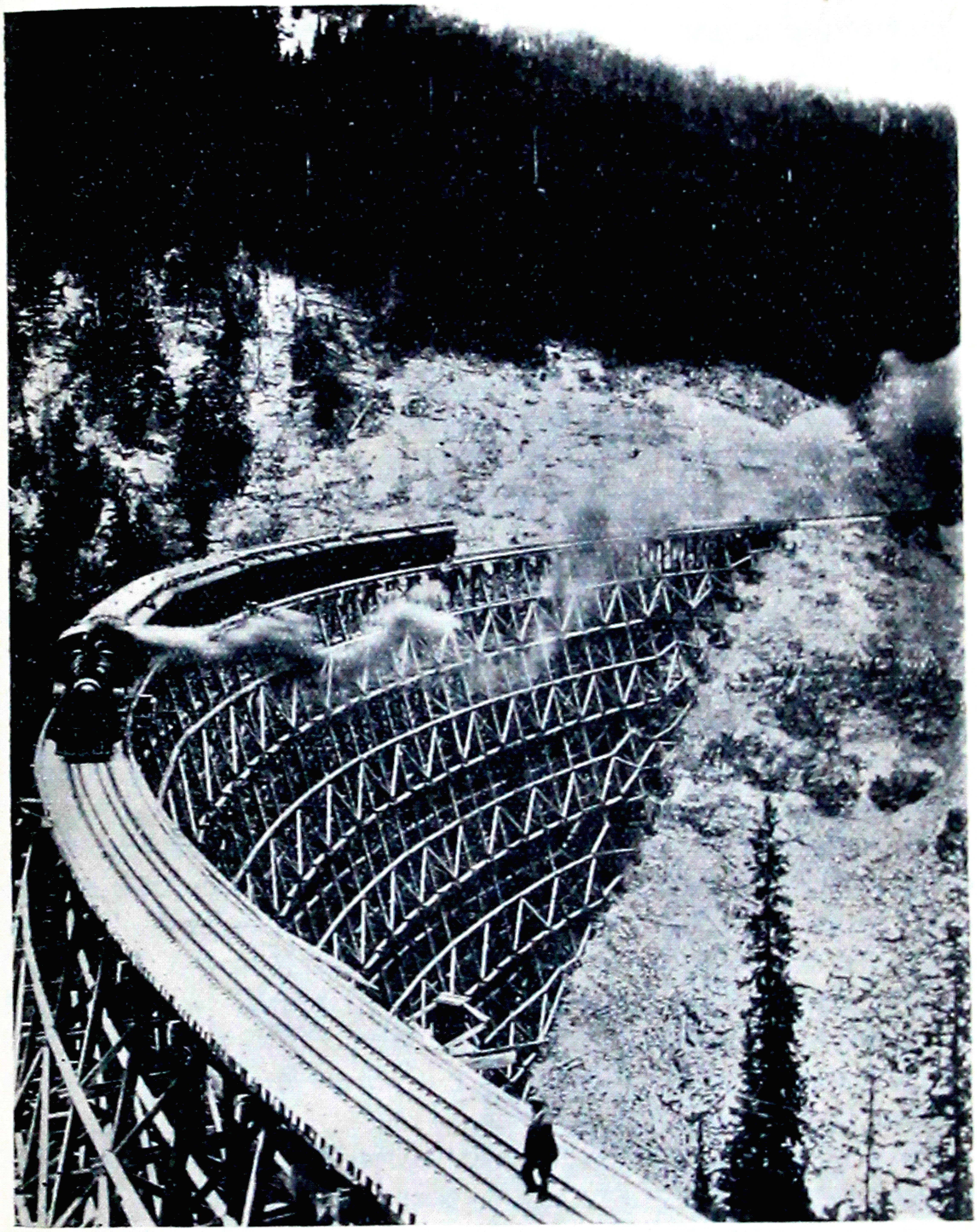


FIG. 57. TRESTLE BRIDGE, KETTLE VALLEY, BRITISH COLUMBIA

In mountain-country a deep gulley may be as much an obstacle as a precipice. The level grade is maintained here by means of a curving trestle.

Photograph by courtesy of the Canadian Pacific Railway

syllabus by studying the geographical aspects of important engineering-works in America. The topics selected were determined in part by the books that could be obtained. As worked out in this case the study was concerned chiefly with railways, and included the following:

(i) The need for railways in North America (particularly in Canada), so far as the children could understand this with the help of map-study (*e.g.*, facts about size, distances, etc.).

(ii) The building of certain parts of some of the great Canadian railways. Characteristic difficulties by which the engineers were faced in different parts of Canada:

(*a*) *Region North of the Great Lakes.* Forests, muskeg (swamps), rugged country of hard rock, intricate systems of lakes and streams, etc.

(*b*) *Prairies.* Complete absence of timber over enormous areas.

(*c*) *Western Mountain Region.* The need to find suitable passes through parallel ranges. Problems of keeping low gradients and gentle curves; of constructing recurving loops and bends in the track; of crossing deep gullies or wide valleys; of negotiating precipices. The need for trestles, viaducts, cuttings, tunnels, ledges carved in mountain-sides, snow-sheds, etc.

It will be seen that in a study such as the above some outstanding facts of relief and surface conditions are not only learned, but are visualized all the more clearly because they are considered in relation to certain human activities. If the work is carefully taken there should be no risk of overgeneralization, since the fact that the details discussed often concern a limited area or a single locality should be patent to the children.

In a study of this kind three distinct classroom methods appear: (*a*) direct study of pictures and maps by the children, with suitable guidance; (*b*) description and narrative by the teacher; (*c*) investigation (to follow up questions) either by class discussion, or by the teacher's explanation, or by reference to books. Examples of pictures and maps are given in Figs. 55, 56, 57, 58, and 59.

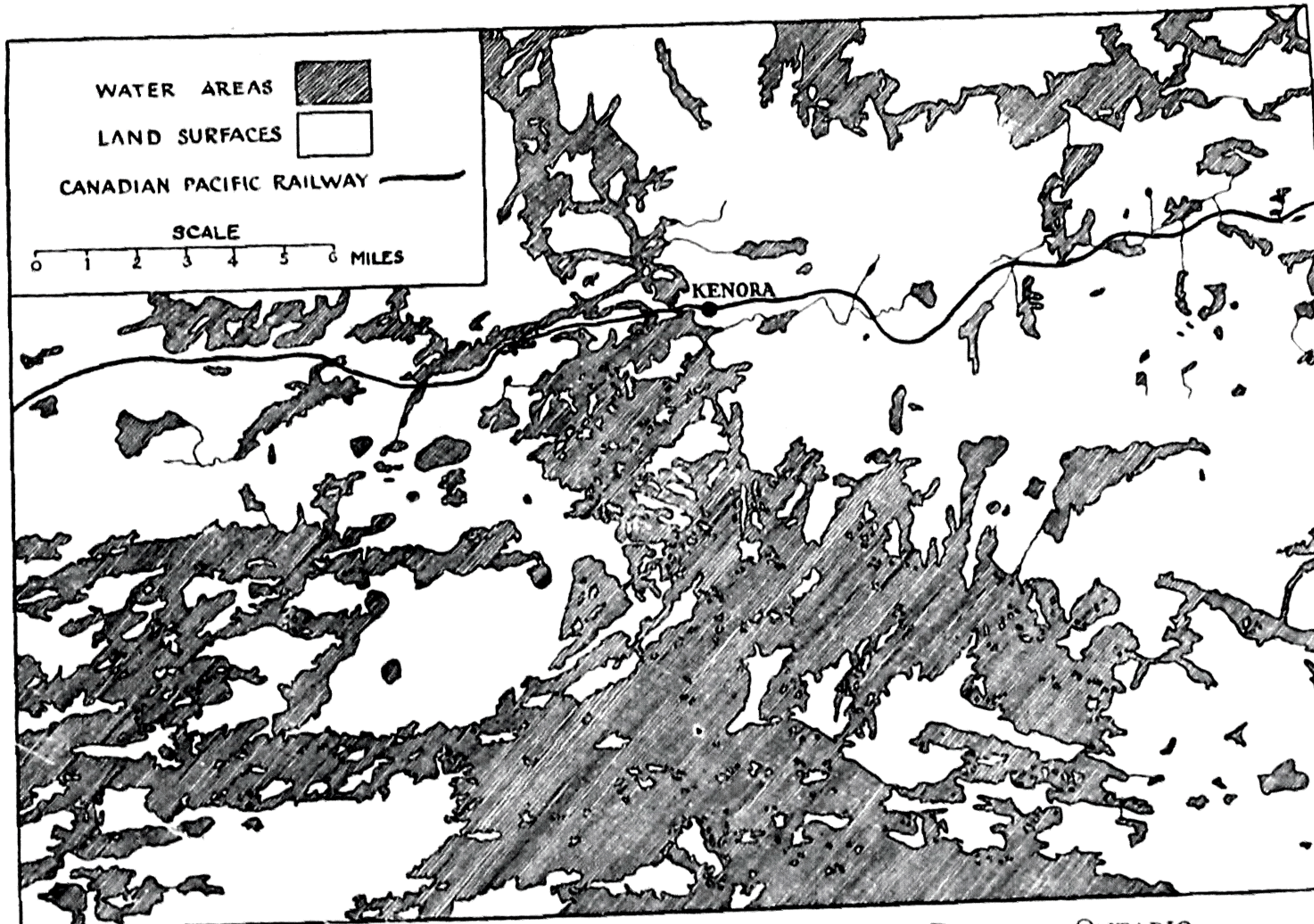


FIG. 58. MAP OF PART OF THE LAKE OF THE WOODS DISTRICT, ONTARIO

The original proved a source of great interest to several classes of children aged about ten years. No ordinary atlas-map can indicate the maze of lakes and islands through which the railway engineers had to find a way in this area.

Based, by permission, on a map published by the Canadian Pacific Railway

Examples of narratives by the teacher might be: (*a*) how a pass was eventually discovered by noticing the flight of an eagle that appeared to vanish into the mountains; (*b*) how embankments, built on what had appeared a sufficient foundation, sank overnight into the muskeg (swamp north of Lake Superior), leaving the rails suspended in mid-air; (*c*) how advance-parties of surveyors or track-makers barely escaped death by starvation in winter if any hitch occurred in the carrying of supplies by sledge over hundreds of miles; etc.

The study of railway construction might suitably be followed (or preceded) by other studies concerning railways. For example:

(i) The railways as they are worked to-day—*e.g.*, the enormous freight traffic in North America: the handling in bulk of grain, ore, coal, oil; the industrial sidings, the port terminals, equipment for storage (elevators, etc.) and for shipping; the localities in which the articles transported are produced; the interdependence of various parts of the U.S.A. for certain products; the export traffic.

(ii) Maps of the railways for parts and the whole of North America (see Fig. 59).

(iii) Some of the most outstanding differences between American railways and our own, and reasons for these—*e.g.*, (*a*) that trains on the American trunk-lines are equipped so that one can live in a single train for days (geographical distances); (*b*) that snow-ploughs have to be used regularly in the winter on certain lines (climatic conditions); (*c*) that various precautions have to be taken to prevent fires (conditions of regional geography—forests, prairies, scarcity of population over long stretches).

Although the work outlined above does not exclude some subject-matter that is not geography, the emphasis is definitely geographical. The amount of geography to be learned by the way is probably as much as children are likely to learn in an equivalent period with more stereotyped geography lessons. For example, the names and positions of important junctions and termini, of great cities and centres

K

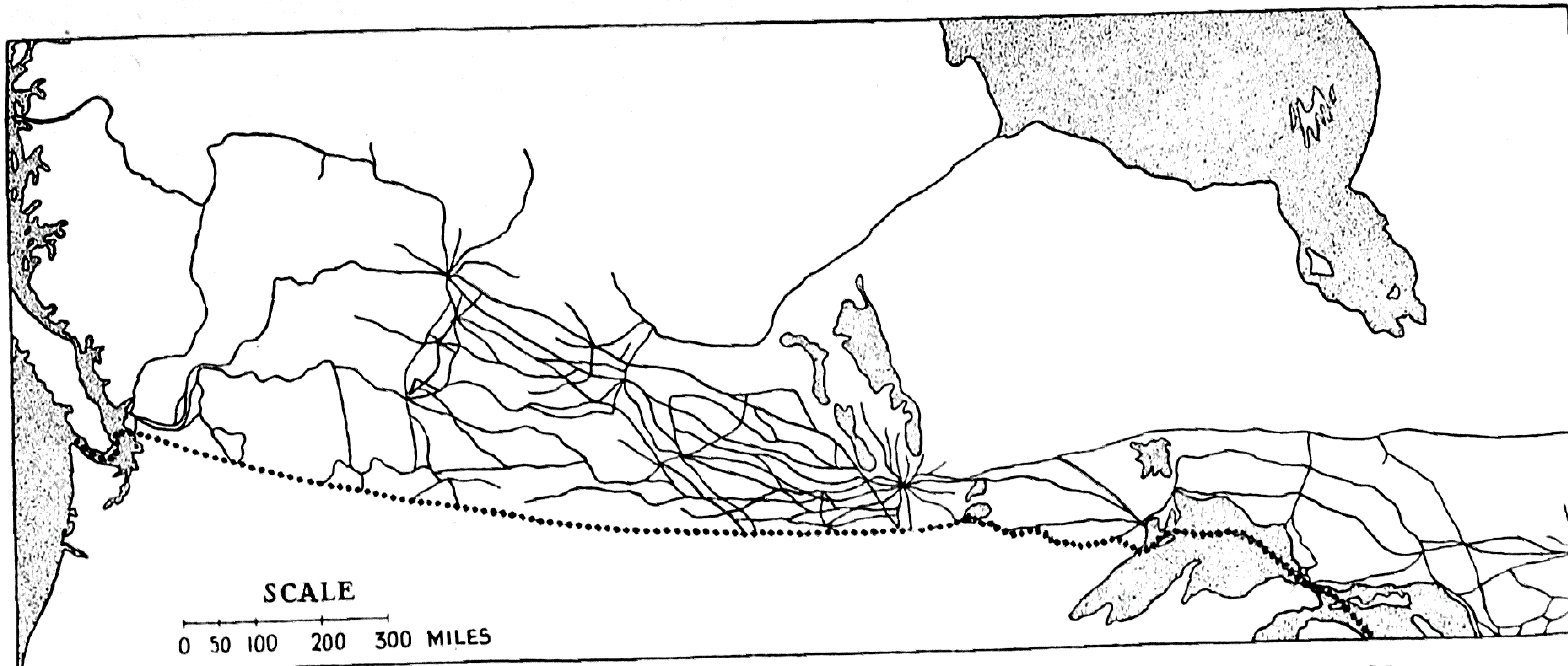


Fig. 59. Map showing the 'Railway Patterns' in Part of Canada as marked on the Map of Canada in a School Atlas

Although the atlas-map cannot show every line that exists (at least in the areas where lines are numerous), certain typical features stand out, and are readily noticed by children when they see the railways unpacked from the atlas-map in this way. Some of the features are: (i) The crowding of railways to the south; (ii) absence of railways over wide areas in the north; (iii) lone railways—*e.g.*, that seeking the summer outlet on Hudson Bay and those piercing the Western Mountains; (iv) the dominant east-west direction of the railways in general; (v) the number and parallelism of the railways across the prairie regions; (vi) the web or wheel patterns where the railways seek certain centres—*e.g.*, Winnipeg, Edmonton, Port Arthur, etc. A great deal about the relief, climate, and economic geography of Canada can be learned by seeking explanations of these facts.

of commerce, become familiar through frequent reference, often without conscious learning. Moreover, geographical terms like 'trade centre,' 'junction of routes,' are not only introduced, but come to hold a wealth of meaning. The children have some detailed acquaintance with the nature of the work that goes on in actual examples—for instance, Winnipeg, Chicago. Other kinds of geographical knowledge are sought, because they are necessary to explain this or that. Facts about relief, climate, vegetation, economic geography, etc., are learned not as items under separate headings in a text-book, but in relation to other facts of human interest, and because they appertain directly to what the children want to know. Neither relief, climate, vegetation, nor economic geography can be treated exhaustively, but this would be true in any case with children of the age in mind. The fact that the various items of knowledge *can* be classified under these headings and the value of so arranging them begin to grow clear to the children.

The foregoing examples illustrate the fact that the more advanced geography of secondary or grammar schools may be approached in the junior or preparatory school by *using* interests that are sometimes ignored as beside the point in school-work. School geography should also *give* interests which the children might not acquire without it. The examples also suggest this, but mainly in connexion with subject-matter. As they grow older children begin to appreciate what might be called the *method* of the subject, but work in this direction belongs largely, though not entirely, to the secondary school and university.

Within any class there is often considerable variation of interest, and up to a point children's individual tastes should be respected. On account of its wide range school geography gives opportunities for choice of study more frequently, perhaps, than the majority of school subjects. For the same reason it enables a teacher to allot studies appropriate in content and difficulty to particular members of a class, while still keeping to the syllabus of the work in hand. In

the junior school it is generally best to allow individual work of any kind to develop only after a suitable foundation has been laid by ordinary class-work. A common basis of tool knowledge and of background knowledge is usually necessary for the work to be profitable and sufficiently economical of the children's time. This and other facts are indicated briefly in the following example.

Example V. Individual Choice of Study

(*a*) Choice within a Wide Range

For the sake of simplicity let us suppose that a class of children is studying a continent. The class consists of boys and girls of varying capacity and tastes. The children are not older than twelve years, and therefore the study made by any one of them cannot be exhaustive. Yet the subject offers an unlimited number of topics suitable for the children to investigate, far too many to be included in the usual number of class lessons. The work for one or more terms may be planned as follows:

(i) A limited series of class lessons and text-book work is taken first, in order to give every member of the class a background from which to work and to bring to light the topics to be studied independently. In the case of a continent this preliminary study should probably include: (*a*) the position, shape, and extent of the continent; (*b*) the names, positions, and relative sizes of the chief countries and political divisions; (*c*) certain essential facts about relief and climate. These are probably best given by lessons on representative areas, rather than by generalizations, with children of this age.

(ii) Teacher and class discuss the possible subjects for independent study, and tasks are allotted to groups or to individuals. The topics may be all of one type—*e.g.*, various occupations or industries or various countries or regions for detailed investigation. Whether or not the field is limited in this way, it is necessary for the teacher to plan out the

work tentatively beforehand. One important reason lies in the fact that the teacher needs to be familiar with the books available, since in some cases subjects which the children would like to explore have to be cancelled through lack of suitable reading-matter.

(iii) Each child or group of children, having selected a topic, studies it independently, making notes, collecting or drawing pictures, maps, etc., with a definite purpose in mind. This may be the compilation of a book to which all members of the class contribute, or the giving of 'lectures' to the form. Sometimes, when the work is not of a standard to allow either of these, the teacher finds that the best plan is to take a concluding series of lessons in which each member of the class is called on to contribute the facts he has learned at a point where they apply. (In a small class studying North America, when a wide choice was allowed, some of the subjects selected by the children were: the journey from England to Montreal, New York, Niagara Falls, fruit-growing in California, ranching, cotton-growing, lumbering, Eskimo, oil-mining, etc.)

Among the advantages offered by work of this kind are the following:

(*a*) Children are enabled to follow up their own questions. In ordinary class-work there is rarely time to deal with the questions put forward by each member.

(*b*) Opportunities are given for experience in independent study, for using books of reference, atlases, etc., by oneself, without constant direction, and without interruption (*e.g.*, when, as a member of a class, one must follow the *teacher's* line of thought). Yet at the same time children who need special help can obtain it without wasting the time of others.

(*c*) When study of this kind is well under way and the children are able to work independently the teacher has opportunity, even with classes of forty, to take short discussion with groups of five to ten children, so achieving the kind of work that is impossible with the full number.

(*d*) Children can work at their own rates. The quick are

not held back, and the slow are not confused by having to keep pace with the rest.

(*e*) Each child can gain mastery over a piece of knowledge that is his very own. He becomes an 'authority' on that subject. He experiences the pleasure of seeking and the joy of independent achievement.

(*f*) Probably of greatest importance is the fact that the very nature of the work makes it clear to each child that what he learns is but a tiny fragment of what there is to know. He has not 'done' the continent!

(*b*) More Limited Choice : An Assignment of Work

Work of this kind lends itself to many adaptations. Often it is suitable to give the children definite guidance in their 'researches,' perhaps in a form resembling an assignment of work. Suppose that a class is making a co-operative study concerning the produce in a greengrocer's shop (*cf.* pp. 205–210), and that each child is investigating the production and supply of a single fruit. The work is facilitated if the children are given questions or headings to guide their study. A typical set of instructions might be as follows. (In a very large class it is often convenient to arrange for a group of children to study the same topic. The written work can then be shared. For example, different members of a group would contribute parts (ii), (iii), (iv), and (v) below.)

TYPICAL ASSIGNMENT

The Production and Supply of a Familiar Fruit[1]

(i) Collect your information by:

(*a*) Noticing names on wrappings, labels of boxes, advertisements, etc., in the shops and elsewhere.

(*b*) Making inquiries where you can.

[1] A copy of this should be given to each member of the class

(*c*) Reading. You will find the following books helpful.[1] (Remember to return each book to the reference shelf in the form library whenever you are not actually using it.)

(ii) Find out if you can:

(*a*) Which countries, and exactly which parts of each, produce the fruit.
(*b*) Which of these countries produces most.
(*c*) Which of these countries sends most to England.
(*d*) How much of our supply is produced in Britain. In which parts of Britain the fruit is grown.

Show some of these facts by means of maps and diagrams.

(iii) Find out *how* the fruit is cultivated. Be able to describe the work of the people who grow it in one of the countries mentioned.

(iv) Find out some of the conditions needed for the fruit to grow well, particularly conditions of climate.

(v) How is the fruit packed and cared for in transit? Be able to describe the journey from the place of production to the shop in England. Make a map to show the journey.

Summary of Principles Involved

In summarizing the principles suggested in this chapter the following points stand out:

(i) Much of the work included is what some people would call *applied geography*. If we accept this appellation it is not as a criticism. A child who sees, early in his school career, the application of a subject to things that interest himself and to facts of importance in life in the world realizes the value of the subject.

(ii) The initiative, the choice of study, and the effort or work entailed in pursuing it lie to a large extent with the children. The teacher's part is almost comparable to

[1] A list of the books available is given here (see book-list at the end of this chapter).

that of a fellow-voyager with wider knowledge and experience. He must be able to take the helm when necessary, so that the course is right geographically and meets the children's needs educationally. For a teacher to do this a mastery of his subject alone is not enough. It is even more important that he should work, to use a Froebelian phrase. "*with* the children."

BOOKS FOR REFERENCE

ADAMS, SIR JOHN: *Modern Developments in Educational Practice* (University of London Press, 1928). Includes many further references.

Report of the Consultative Committee on the Primary School (H.M. Stationery Office, 1931).

BOOKS USEFUL IN CONNEXION WITH EXAMPLE I (pp. 269–276)

WOODWARD, H. B. (ed.): *Stanford's Geological Atlas of Great Britain and Ireland* (Stanford, 1913).

HOLMES, A.: *Principles of Physical Geology* (Nelson, 1944).

BECKINSALE, R. P.: *Land, Air, and Ocean* (Duckworth, 1943).

British Regional Geology (H.M. Stationery Office). In many volumes, each describing one region.

DAVIES, G. M: *Geology of London and South-east England* (Murby, 1939).

EVANS, I. O.: *Geology by the Wayside* (Murby, 1940).

TRUEMAN, A. E.: *An Introduction to Geology* (Murby, 1939).

—— *The Scenery of England and Wales* (Penguin Books, 1943).

LAKE, B., and RASTALL, R. H.: *A Text-book of Geology* (E. Arnold, 1941).

WATTS, W. W.: *Geology for Beginners* (Macmillan, 1929).

SEWARD, A. C.: *Geology for Everyman* (Cambridge University Press, 1943).

EARLE, K. W.: *The Geological Map: An Elementary Text-book for Students of Geography and Geology* (Methuen, 1936).

EVANS, I. O.: *The Observer's Book of Geology* (Warne, 1949)

READ, H. H.: *Geology* (Oxford University Press, 1949).

SWINNERTON, H. H.: *Solving Earth's Mysteries; or Geology for Boys and Girls* (Harrap, 1946).

WELLS, A. K., and KIRKALDY, J. F.: *Outline of Historical Geology* (Murby, 1948).

MACKINDER, H. J.: *Britain and the British Seas* (Oxford University Press, 1907).

STAMP, L. DUDLEY, and BEAVER, STANLEY H.: *The British Isles: a Geographic and Economic Survey* (Longmans, 1933).
—— *Britain's Structure and Scenery* (Collins, 1946).
STEERS, J. A.: *The Coast-line of England and Wales* (Cambridge University Press, 1947).
HOWE, J. A.: *Stones and Quarries* ("Common Commodities" series: Pitman, 1920).
RUSSELL, SIR E. J.: *The Chalk Lands of England* (Leaflet published by the School Nature Study Union).
—— *Lessons on Soil* (Cambridge University Press, 1950).
WARD, E. M.: *English Coastal Evolution* (Methuen, 1922).
Reports of the Royal Commission on Coast Erosion (H.M.S.O.).
ELLIS, C.: *The Pebbles on the Beach* (Faber, 1954).

Local geological maps on the scale of one inch to one mile can be obtained printed in colour for some parts of Britain at a reduced price for educational purposes from the Director-General, Ordnance Survey Office, Southampton.

Geological maps, at present out of print, on the scale of one inch to one mile, as well as six-inch geological maps for certain areas, may be seen (and traced) at the Library of the Geological Museum, Exhibition Road, South Kensington, London, S.W.7.

Memoirs describing each sheet (and on other geological subjects —*e.g.*, water-supply, etc.) are published by H.M. Stationery Office for the Geological Survey (catalogues on application to the Ordnance Survey Office).

See also book list on pp. 314–315.

BOOKS USEFUL IN CONNEXION WITH EXAMPLE IV
(pp. 282–289)

SMITH, J. RUSSELL: *Industrial and Commercial Geography*, Part II, Chapter 2: "Trade Routes of North America" (Constable, 1933).
STAMP, L. D.: *Chisholm's Handbook of Commercial Geography* (Longmans, 1937).
METRE, T. W. VAN: *Trains, Tracks, and Travel* (Simmons Boardman Publishing Co., New York, 1927).
TALBOT, F. A.: *The Making of a Great Canadian Railway* (Seeley, Service, 1912).
MORRIS, K.: *The Story of the Canadian Pacific Railway* (Stevens, 1931).
ALLEN, C. J.: *Railway Building* (Shaw, 1926).
—— *The Steel Highway* (Longmans, 1928).
—— *The Railways of To-day* (Warne, 1929).
WILLIAMS, A.: *The Marvels of Railways* (Seeley, Service, 1924).
REED, BRIAN: *Railway Engines of the World* (Oxford University Press, 1934).
BOFF, CHARLES: *Boy's Book of Tunnels* (Routledge, 1938).

Other Books suitable for Kindred Topics

Flaxman, E.: *Great Feats of Modern Engineering* (Blackie, 1931).
Jackson, G. G.: *Triumphs and Wonders of Modern Engineering* (Sampson Low, 1930).
Cressy, E.: *Stories of Engineering Adventure* (Warne, 1928).
—— *Civil Engineering To-day* (Oxford University Press, 1938).
Lewis, P.: *The Romance of Water-power* (Sampson Low, 1931).
Little, W. B.: *The World's Work in Industry* (Pitman, 1931).
The Mastery of Water; The Mastery of Earth; The Triumph of Man (series published by Pitman).
Hamilton, A. M.: *Road through Kurdistan: the Narrative of an Engineer in Iraq* (Faber and Faber, 1937).
Dance, H. E.: *Engineers at Work* (Nelson, 1943).

Some Children's Books useful in Connexion with Example V
(pp. 289–291)

Polkinghorne, R. K. and M. I. R.: *What the World eats*, Chapters 1–7, Our Favourite Fruits, Vegetables, etc. (Evans)
Rayner, P. R.: The Kingsway Social Geographies, Book III, *The Cultivators*, Chapters 14–17, Bananas, Dates, Oranges, Grapes, Apples, Coconuts (Evans).
—— Kingsway Geography Readers, *At Work in Many Lands*, Chapter 2, Date-growers of Tunis, and Chapter 5, In the Orange-groves of Spain; *At Work in Britain*, Chapter 6, Flower-growers of the Scilly Isles (Evans).
Forsaith, D. M.: *Other Children's Homes*, Chapter on a South African Orange Farm (Black).
Fairgrieve, J., and Young, E.: *Real Geography*, Book III, Chapter IX, Spanish Oranges (Philip, 1939).
Scott Watson, J. A.: *The Farming Year*, pp. 93–118, Vegetables, Flowers, Orchards, etc. (Longmans, 1938).
Street, A. G.: *Round the Year on the Farm* (Oxford University Press). Describes work connected with potatoes in various months.
Edwards, R. S.: *Fruit Farming*. Young Farmers' Club Booklet, No. 21 (Evans).
Finch, R.: Geography through Shop Windows (Evans, 1931).
Garnett, O.: "The Discovery Books," Book I. *Looking and Doing* (Blackwell, 1949). Includes pictures of and information about Covent Garden Market, and the production of potatoes, flowers, etc.

CHAPTER XII

WORK WITH CHILDREN YOUNGER THAN ABOUT EIGHT YEARS

Geography not a 'Subject'

Two reasons of fundamental importance indicate that geography proper should not appear as a subject on the time-table for children younger than nine years at least.

(i) The first reason concerns the child rather than the subject—viz., that children younger than about nine years at least divide their interests between *topics*—*e.g.*, the seaside, aeroplanes, the fastest racing-car, etc.—but are without any conception of the academic classification of knowledge according to *subjects* (of a curriculum)—*e.g.*, history, geography, physics, etc. In pursuing lines of investigation prompted by their own interests young children frequently gather items of information which the adult recognizes as belonging to one or more of the academic subjects. For example, a child digging on the beach finds that to make a pool he must dig close down to the water in the wet sand, preferably at low tide and where the slope is negligible. If he thinks about it at all this knowledge appears to him as "where to dig a pool." An educated adult realizes that the child is using facts about the saturation-level or water table, information that has its place in physics, geology, engineering, and geography. Yet it would be unsuitable, and boring to the child, to theorize about his discovery from the point of view of any of these subjects. The most that an adult can do is to play *with* the child, possibly helping him through play to discover more information of the same practical kind, answering his questions simply and directly, but not bothering him with further questions or instruction. The 'geography' that a child learns before the age of eight should

be largely of this character—*i.e.*, incidental knowledge gathered through the pursuit of topics in which he finds a deep and vital interest, topics which are his own, not the teacher's. The information gathered in this way, so far as it has any system at all, is systematized for the child round the topic, and is worth while to him for that reason. Information systematized in a manner suitable to an academic subject is foreign to a young child.

(ii) The second reason concerns the subject more closely—viz., that the greater part of the "geography of geographers" cannot properly be studied without a certain equipment of knowledge and understanding, among which an ability to use maps, both for purposes of reference and as a means of expression, probably takes first place. Therefore geography proper cannot begin before a child is over nine years of age.

Nevertheless, whether or not it may be recognized as the "geography of geographers," there is much of geographical value in normal play activities of children between the ages of five and eight. The fault in the past has been not only that teachers have failed to utilize this, but that they have been too anxious to give the children something which they (the teachers) recognize as geography. As a result topics have been introduced which are from many points of view unsuitable for children younger than about nine years (*e.g.*, "Children in Other Lands").

The following is a list of points that should be kept in mind when planning work for children up to the age of seven to eight years at least:[1]

(i) Children under eight are naturally interested mainly in phenomena and incidents that occur within their own environment or experience.

(ii) They are very much aware of their surroundings, and are often unable to create in imagination a true picture of conditions that are widely different from those to which they are accustomed. Such a child's conception of a foreign land often seems to be in any details that are not actually mentioned similar to his own. For example, it is not unknown

[1] See also pp. 24–34 and 130–133

for a young child to suppose that a Congo Pygmy would use common things like paper and coal until he is actually informed to the contrary. (Sometimes, on the other hand, the child's mental picture is made too much unlike his own environment through exaggeration of the differences.)

(iii) The experience of young children is generally limited. They may not always be able to recall the impressions on which the teacher hopes to build. For example, to compare a given variety of tropical weather with that of a hot summer day in this country may convey little, if anything, to a child of six, in March. In the winter of 1933–34 before snow had fallen a child of six regarded scornfully an older child's representation of snow with cotton wool. He was enlightened when a fall of snow took place.

(iv) Often the background knowledge necessary to see a geographical subject as a reality is beyond the capacity of children so young. Some of the usual stories about "Children in Other Lands" contain incidents or references that appear fantastic or even silly to children whose knowledge, and therefore sympathetic understanding, is limited. Even when there is nothing in the story that appears to be 'funny' it is often accepted in the same manner as any nursery tale. It may be imagined very clearly, but it belongs in the child's mind too closely to what Piaget calls the "world of play," as distinct from the "world of reality," to be acceptable as true geography by serious educators or geographers.

(v) To admit, as the advocates of "Other Lands" geography for children of this age generally do, that the information must be *told* (usually 'in story form') is to confess the need to use methods that are not educationally the best. Children of this age cannot attack such a subject for themselves. Too much has to be given to them by the teacher, and the 'story form' is a cloak to disguise what is virtually telling the facts, or 'lecturing.' This means that it is not in line with modern educational methods, which demand that topics chosen for work by children of any age should lie, as far as possible, within the children's power to investigate for themselves. This does not mean that *no*

stories should be told to children of this age! (See pp. 306–311.)

(vi) On the teacher's part lessons about topics like the life of "Children in Other Lands" demand an intimate knowledge, of the kind usually gained only by long residence in the countries concerned. Detailed information from first-hand authorities is the only possible substitute. This is not in itself a reason against taking such a topic. It is meant as a warning to those who would venture too readily upon a subject that may appear attractive and even easy, but which, perhaps more than any other, calls for special knowledge, knowledge of a kind that is often impossible to obtain from books.

Most of the above considerations apply more particularly to children younger than seven or seven and a half. In the rest of this chapter an attempt is made to suggest more definitely the activities of geographical value that appear to be suitable for children younger than eight. Some (for children from seven to eight plus) have already been considered in Chapter III.

Although no clear division can be made, it seems best to consider first the work for children younger than about six and a half to seven, and then the work for children between this age and eight years. So much depends on environment and background, and on the children's previous experience and training, that the ages suggested should be taken only as a rough guide.

Work with Children Younger than Six and a Half to Seven Years

Given the opportunities that are his right, from babyhood onward the child is continually and rapidly adding to his store of knowledge through first-hand experience, collecting impressions about all manner of things. Geography is only one of the subjects to which the knowledge so acquired may appertain. Nevertheless the child's delight in the investigation

of his environment is at least as valuable for geography as for any other school subject. One or two illustrations must suffice to show what is meant.

If allowed to pursue certain normal play activities without restrictions most young children gain valuable experiences concerning the behaviour of water in a variety of circumstances, and concerning the characteristics and behaviour, also under varying conditions, of sand, mud, clay, stones, pebbles, etc. In later geographical work the teacher is apt to take the child's familiarity with these things for granted, but it is a fact that many town children receive very few opportunities for acquiring it. Even when preparing for a School Certificate examination town children may learn much text-book information concerning *clay lowlands* without any real acquaintance, based on actual contact 'in the field' or in the hand, with the nature of clay itself. They may use such terms as *alluvium* or *alluvial deposits*, never consciously having witnessed the transportation and deposition of graded sediment by running water—*e.g.*, by a stream in flood, by storm water on a gravel drive, or water from can or hose on a sloping garden path. Yet, given the opportunities, it is precisely this kind of experience which much younger children can gain through normal play activities—*e.g.*, in the above case by blocking the course of a runnel of water with a stick or line of stones.

> Nothing seen is stale or obvious to young children. Buildings and bridges and road repairs, railway stations and trains, motor-cars and aeroplanes, water in the bathroom taps and drains, soap-bubbles and smoke, the gasfire and the electric light, the rain and the sun, the life and the movements of animals, even our own behaviour to the child, come under his scrutiny and his effort to understand.
>
> The extent of even a small child's devotion to this wondering interest is always surprising to the sophisticated adult. The child will stand and watch some happening that interests him in the street or in the fields until our patience is long exhausted, and on coming home he will play out what he has seen in dramatic repetition that bores the grown-ups, but enchants the child himself. . . .

> Nor is the little child's interest in real happenings confined to passive contemplation, verbal questioning, and dramatic expression. If he has the chance he will try to find out by practical handling and experiment. . . .
>
> It is not so much information we need to give as the comradeship of interest in the world. Our sharing of his adventure of discovering the world is what the child seeks in us.[1]

The enthusiasm and energy with which children pursue these interests suggest that the beginnings of school subjects lie in them, not in the preconceived idea of adults, who, so far as the young child is concerned, are often too clearly aware of the subjects as such. The unenlightened observer probably sees little or nothing of geographical value in these activities. Moreover, it is quite impossible to classify childish interests as appertaining to one subject rather than to another. Simple nature study has long been recognized as one of the approaches to geography with young children. A study of the weather and of its effect on plant and animal life, including human life, has an important place in this connexion, at least in the country. With town children it may, perhaps, be wiser to postpone anything like sustained weather-study till after the age of seven at least.

The nature of children's interests may change from day to day, from moment to moment. Some interests are quite transitory, some a never failing source of delight. Occasionally one is pursued to considerable lengths, particularly if the child shares his interest with an adult who knows how to work with him in all seriousness without becoming didactic.

The teacher's part at this stage, therefore, is to allow the children freedom for their exploratory interests, to create an atmosphere in which these interests are encouraged and developed, and to supplement the children's normal environment in any direction where a serious lack is apparent. For example, children at an inland slum school who have few or no seaside or country experiences should at least have opportunities to play with water and sand in large quantities

[1] Mrs Susan Isaacs, "The Child as Scientist," in *The Spectator*, August 8, 1931.

in school, and to find in the school garden opportunities to supply the garden experiences which the children of wealthier parents are able, *if allowed*, to find at home.

It is not to be assumed from the above that all talk about foreign lands should be avoided completely with children younger than seven to eight. The teacher should not, however, introduce it deliberately, but should remain content with answering the children's questions when they demand it. Such occasions may not be infrequent. Some information is obviously called for when a child makes inquiries about an Indian he has seen in the street, or an elephant at the Zoo, or hears about some remarkable aeroplane flight, or has a relative who goes abroad. There should, however, be none of the kind of instruction that needs a map or a globe. The child's questions should be answered simply and directly—*e.g.*, "In a country called India . . ." On no account should his questions be taken to imply that the child is ready and able to learn a great deal about Indians or India!

Work with Children aged about Six and a Half to Seven Plus

By the time a child is about six to seven years of age his interests generally have become less transitory. He has a greater capacity to concentrate on one topic for a considerable length of time, to pursue a piece of creative work or investigation from one day to another, or even from one week to another. In addition his interests have become more clearly crystallized, partly because he now takes much of his environment for granted. To give an exhaustive list of the interests related to geography is impossible, but the following may be taken as representative:

Vehicles of all kinds; in fact, everything associated with transport—*e.g.*, trains, railways, ships, boats, motor-cars, aircraft, etc.

Powerful things that work—*e.g.*, cranes, steam-engines, mechanical navvies, excavators, machinery of all kinds.

Any kind of work that is creative or powerful and which the child can watch or has watched. The man who does it is regarded with admiration and imitated in play—*e.g.*, an engine-driver, a road-mender, a signal-man, a builder, etc.

Animals—*e.g.*, those met with in pictures and stories or seen at the Zoo.

Stories, particularly those about animals, adventures, etc. (often of a somewhat fantastic kind).

A large number of these and other interests afford suitable topics for work of geographical value. The rest of this chapter is devoted to a fuller consideration of some of them.

Work and Workers

The child's delight in watching the activities of workers engaged in interesting occupations gives the teacher unlimited opportunities for laying a suitable foundation for future geography. For example, at a later age the children will probably learn about "Homes in Other Lands" or about important routes or highways. There could be no more valuable preparation for this than an observational study of the building of a house near the pupil's own home, or the construction of a by-pass road or a new bridge in the neighbourhood. To watch the creation of a house from the laying of foundations to the glazing of windows, the guttering of the roof, or the fixing of water-pipes helps a child not to take his own dwelling too much for granted, but to see it as a thing that has been planned and made. He will thereby be prepared (at a later age) to regard the building of a Kafir *kraal* or of an Eskimo *igloo* as another way of meeting problems or needs in some respects similar to those met by a house-builder in this country, but under different conditions, with different materials, and with less equipment of knowledge, tools, etc. To watch the making of a new piece of road enables the child to realize that all streets and pavements over which he walks have been constructed where there was once open countryside. It helps him to respect the network of roads that makes travel so simple in this country, and a

country without roads should be more easily intelligible to him.

An observational study of this character was recently made by children who watched the building of a new bridge at Richmond. More usual subjects for observation are such places of activity as railway stations, goods' yards, markets, harbours, docks, busy riverside wharves, quarries, etc. Town children have advantages that country children miss, and *vice versa*.

A Farm. The majority of children who live in city suburbs, frequently in flats, have only occasional contact with the natural surface of the earth. Some have never watched a field being ploughed, because their holidays come at the wrong time, and because even when their parents take them out for picnics they spend the time on downs, heath, or common, or in the woods. They learn in geography about the farming-lands of Britain, but they have little or no knowledge, based on observation, as to what *farming* really means. In these days of easy motor-transport it should become the rule, not the exception, for visits to such places as a farm to be organized from the school.

The everyday work on a farm offers innumerable subjects of great interest for children of about seven to eight. Moreover, the activities and processes which they delight to watch are of fundamental importance in the life of mankind on the earth. To suburban children milk and bread come *from the shop*, and, at least by the children of relatively wealthy parents, their existence is taken for granted.

Means of Transport. All kinds of vehicles and means of transport are a never failing source of interest to young children, and the variety of methods by which this interest can be utilized in school is almost without end. It is generally best to begin with means of transport with which the children are thoroughly familiar. At first the interest is concentrated on the form, size, and speed of the vehicle, but later the children can be led to perceive facts of greater significance. Some simple classification can be made—*e.g.*, between land-, water-, and air-transport—and the children

can collect pictures and make drawings or models of vehicles within these three categories. Later comes a realization that some means of transport are slower and cheaper, others more rapid and costly; that some vehicles are meant to take bulky or heavy loads, others small or light ones; that the form and type of a vehicle are determined not only by what it is to carry, but also by the places to which and through which it is to travel. From this point of view an ocean liner can be contrasted with a barge or river-steamer, a lorry with a delivery bicycle, a motor-coach with an express train.

Sometimes a single topic proves to be of all-absorbing interest—*e.g.*, a railway station or a model railway-track. Many topics lead naturally to the making of simple maps, or even, with children of about eight, to the consulting of large-scale maps which show "where the railway goes to," etc. Visits to places like docks, an aerodrome, or a country market provide both a suitable climax for the introductory work near home and a valuable opening for further investigations of many kinds. A wide and varied study can be made by London children based on a series of visits to one of the bridges over the Thames. There is a great variety of activity both on the river and on the land beside it, and transport of many kinds passes both over and under most of the London bridges. For example, over Waterloo Bridge come carts and lorries with vegetables, etc. (brought by rail), *en route* for Covent Garden Market. Under the bridge go barges laden with timber, cement, stone, etc., waste material for the paper-mills, and coal for the gas-works. All this may lead naturally to questions "Why?" "Where to?" or "Where from?" In addition to the geographical study involved in the answering of questions, the *observation* of the transport in progress, of the activity and movement that is going on near a place like London Bridge, for example, is in itself of educational value. That such a locality offers absorbing interest not only to children is proved by the number of onlookers to be seen standing on London Bridge at any hour of the day.

This type of observation by a child younger than eight is no doubt best carried out in the company of a sympathetic parent, not by class visits organized from school. Often, however, there are opportunities that a class could quite suitably use within reasonable walking-distance of the school building. For example, a class of children aged seven and a half recently made an observational study of the traffic passing the cross-roads at the foot of Putney Hill, about five minutes' walk from their school.

All the subjects considered so far are those which the child can observe at first hand for himself. There is no reason, however, why school work should not also satisfy the growing interest of a child aged seven to eight in things that are strange, provided that the subjects chosen are not too complicated and are well within his grasp. One of the best methods for any 'study' of this kind seems to be through stories.

Stories for Children of about Seven Years

For many years the statement has been made, and blindly followed by a number of teachers, that "geography for little children must be *in story form*." It is, of course, by no means true that stories are the only, or necessarily the best, means of approach to geography. Yet there is no reason why their delight in stories should not be recognized as *one* of the interests which lead children to gain ideas of a geographical character. The stories which serve this purpose are not confined to those that may be labelled 'geography stories.'

A fundamental rule to be borne in mind is that every story should be a *real* story, a good story—*i.e.*, not, as is sometimes the case, obviously invented by some one who does not possess the first-hand knowledge necessary to make such a story at all. Many a so-called 'geography story' is a thinly disguised list of facts, more or less correct, and often at once too limited and too numerous, strung together and attached to the name of a child who 'lives' in a particular land. There

is often no plot, and many points in the story may demand explanations very difficult or quite impossible for young children to understand. Quite apart from the difficulty concerned with the intimate knowledge of detail demanded from the teacher, stories about "Children in Other Lands" often present absurd generalizations. We should not consider a story about "A Little European Boy," but it is at least as absurd to tell one about a 'typical' Indian or Chinese boy or girl. Further, it is a great pity to waste the children's time with poor stories when tales that are both beautiful and genuine are in existence. 'Real' stories suitable for children of the age in mind, and offering a certain amount of geographical content, fall into several categories, of which some are described below.

(i) **Animal Stories**

Most children of seven are interested in lions, camels, elephants, tigers, bears, etc., being already familiar with them in a limited way from picture-books and visits to the Zoo. From a much younger age—say, five years—most children delight in hearing and in telling 'animal' stories of the most fantastic kind, in which no need is ever felt for anything approaching actual possibility or truth to facts. In any case, it is not to be expected that children younger than seven at least would have the mental equipment necessary to imagine these animals *correctly* in their natural surroundings.

No one should wish to do away with this appreciation of fantastic stories about animals, whether they be the fables of old or such modern delights as *Winnie the Pooh*. Yet with children of about seven plus there is also a place for stories that keep as close as possible to reality and truth. Children of this age are not only beginning to acquire a capacity to visualize correctly conditions beyond their own experience, but they also take pleasure in learning of strange things that are *true*.

Three considerations seem to be particularly applicable in

supporting the claim of 'true' animal stories for children of this age.

(i) The children are already acquainted with and interested in many of the better known wild animals of the world, but neither the Zoo nor most of the picture-books present these animals satisfactorily in their own environment. Unnecessary misconceptions creep in—*e.g.*, lions and tigers are juxtaposed, sometimes to remain so, in a geographical sense (as if they inhabited one and the same area), for the rest of the child's life.[1] There is every reason why such interesting creatures as elephants should be 'seen' by the children, not merely as inhabitants of the Zoo, but *living* in the forests or bush of Africa or the jungles of India, as well as at work, for example, in the teak-yards of Burma.

(ii) Though some children of about seven years are capable of fairly accurate visualization of things and conditions foreign to their experience, this is by no means true of all. In the case of animals the details of environment are in some respects less complicated and require less mature understanding than in the case of strange peoples. With stories about children—*e.g.*, about a "Little Chinese Boy"—there is probably a greater danger of mistaken impressions due either to (*a*) unchecked flights of imagination carrying the picture into the fantastic or to (*b*) transference of the familiar from the child's own environment (*e.g.*, an unvoiced assumption that the Chinese boy's rice is a milk-pudding). The danger of misconception is still present if an animal is the centre of the picture, but the child's ignorance is more clearly patent to himself.

(iii) The animals which interest children at the Zoo come from a great variety of regions, and by learning more about these animals in their natural haunts a child acquires some ideas about the widely different conditions that exist in various parts of the world. Without any premature reference to map or globe, and without necessarily using strange terms such as tundra, savanna, etc., a child can yet begin

[1] It is not uncommon to find students who are surprised to learn that there are no tigers in the wilds of Africa—*i.e.*, with the lions!

to realize the existence of what the teacher would term 'different natural regions' simply by learning about the natural life of, for example, bears, giraffes, etc. Though it should not be dignified by the name 'animal geography,' this study is one which serves to awaken or to develop in the children a realization that lands which differ widely from their own may differ equally widely from one another. A word of warning may not be out of place here against the fixing of such tags as "*The* Hot, Wet Forest," etc. A list of books in which suitable stories may be found is given at the end of this chapter. It goes without saying that the stories require selection and adaptation according to the children to whom they are to be told.

(ii) **Simple Stories of Adventure**

A second type of story by which it is possible to give young children 'snapshots' of other lands is that in which the doings or experiences of an English traveller in a strange locality are recounted. It is possible to select incidents from books of travel and adventure which are not too complicated and which do not need too much explanation or description, nor depend on too wide a background of knowledge to be intelligible to children of about seven plus. The daily Press frequently offers suitable material—*e.g.*, when a famous airman gives an account of a recent flight. It is fairly safe to assume that the things which strike a traveller fresh from England would be likely to impress an English child in the same way. There should be directness and simplicity in these stories, together with a wealth of detail of a kind that is necessarily absent from standard geographical works. Centred as it is round an 'ordinary' Englishman, a person who is readily intelligible to them, such an anecdote holds truth and reality for the children. It gives point and unity to material that would otherwise be too remote and too complex for them; and it conveys, sometimes explicitly, sometimes incidentally, or merely by suggestion, many details about countryside, people, places, etc. Inevitably

the picture is limited, but this is obvious to both teacher and children from the very nature of the story. Its limitations are therefore appreciated and taken for granted.

(iii) Folk-tales

Provided that they are selected with very great care, many folk-tales are suitable for children of about seven to eight. Experience suggests that the simpler folk-tales told by the more primitive peoples are more likely to appeal to children of this age than the longer, more sophisticated stories from relatively advanced peoples. Perhaps most suitable of all are those stories about animals beloved of all West African Negro peoples. When telling some of these simple tales the teacher is often surprised by bursts of laughter at points which had not struck the adult mind as particularly funny. It seems that these stories strike a note that appeals strongly to the unsophisticated mind, both in primitive Africa and in an English classroom.

It must not be forgotten that such familiar stories as *Aladdin* and *Sindbad the Sailor* may be classed as folk-tales, but these, if told in the manner and form characteristic of the original, are not really suitable for children so young as those under consideration. The teacher should endeavour to keep as close as possible to the original form of each folk-tale. It is interesting to discover how a literal translation of some West African stories can be given more or less *verbatim* to children. The vocabulary is their own. This is noticeably true, for example, of such a story as "The Jackal and the Drought."[1]

Part of the geographical value of these stories lies in that indefinable quality or atmosphere which clings to the stories of each people, bringing a sense of strangeness, a *difference* from our own stories, and with it a realization that they are stories made by another people, whose daily life is coloured by circumstances (trivial and otherwise) that are foreign to us. Nevertheless there is also a sameness. We recognize among them many a familiar nursery-story in a new guise.

[1] F. H. Lee, *Folk-tales of All Nations* (Harrap, 1931)

This similarity reminds the teacher that the human race is one; that its ideas and aspirations are in many fundamental respects identical the world over. Only the materials in which the ideas are clothed reflect the differences of environment.

EXAMPLES OF BOOKS USEFUL FOR CHILDREN AND TEACHERS

For books on educational principles and method the student should consult the list following Chapter II, p. 43.

Several of the books mentioned on pp. 75–76 and 294 are likely to be useful.

(b) Books about Animals

In several cases, if not all, the stories, etc., need careful selection and editing for telling to children. Innumerable books exist, of which a few are given below:

The Times: Big-game photographs from *The Times* (1929).
LYDEKKER, R.: *Wild Life of the World*, vols. i and ii (Warne, 1915).
ROBERTS, C. G. D.: *The House in the Water: a Book of Animal Life* [1] (Ward, Lock, 1908).
NANSEN, F.: *Hunting and Adventure in the Arctic* (Dent, 1925).
DUGMORE, A. RADCLIFFE: *African Jungle Life* (Macmillan, 1938).
KEARTON, CHERRY: *In the Land of the Lion* (Arrowsmith, 1929).
MARTIN, D., and KIDDELL-MONROE, J.: *Munya the Lion* and others in the same series (Oxford University Press, 1946).
CHRISTY, C.: *Big Game and Pygmies* (Macmillan, 1925).
EARDLEY-WILMOT, SIR S.: *The Life of an Elephant* (E. Arnold, 1912).
SLAUGHTER, C. E.: *Hahtibee the Elephant* (Allen and Unwin, 1931).
MOCKLER-FERRYMAN, A. F.: *The Life Story of a Tiger* ("Life Stories of Animals" series; Black, 1923).

See also book-list on p. 327.

(c) Folk-tales

LEE, F. H.: *Folk-tales of All Nations* (Harrap, 1931). Gives many further references.
FLEMING, R. M.: *Stories from the Early World* (Benn, 1924).
—— *Ancient Tales from Many Lands* (Benn, 1922).
TUCKER, A. N.: *The Disappointed Lion, and other Stories from the Buri of Central Africa* (Country Life, 1937).

A useful bibliography is given on pp. 32 and 33 of *Geography* for March 1940, following an article by H. B. Hodgson ("Folk Tales and Geography").

[1] Wild life in the Canadian backwoods.

CHAPTER XIII

LOCAL GEOGRAPHY

LOCAL studies have been referred to in one form or another in most of the chapters of this book. The present chapter attempts merely to summarize the essential facts about the place of local geography in school-work.

(i) Direct observation provides a large part of the basis of experience on which all knowledge depends. In this connexion the interest of young children in all that they see around them offers plenty of opportunities for the teacher of geography to grasp. *Outdoor* observation and work connected with it should be the central part of a child's study, at least up to about the age of eight to nine years, and in some respects throughout school life.

(ii) For children older than about nine years local study offers starting-points for wider geographical investigations. For example, in making a study of a country market not only have local products—*e.g.*, eggs, live stock, fruit, vegetables, etc.—to be traced to their sources (within a radius of several miles), but also other articles exposed for sale—*e.g.*, agricultural implements, drapery, sweets, etc.—which, though possibly made in England, represent materials gathered from remote parts of the earth.

(iii) Local geography provides an introduction to geographical facts and principles, and gives some of the tool knowledge of geography. For example, the reason why the market is held in this particular town probably teaches facts about the advantages of route-control, nodality, etc.

(iv) It provides examples useful in helping the teacher to convey impressions of unfamiliar places or subjects. A great deal about the behaviour and work of rivers can be exemplified by a study of a local stream, not only over a distance along its course, but also throughout all months of the year

and over several years. Whether in the town or the country, it is possible to refer to local features for purposes of illustration in many branches of geography more frequently than is always realized.

(v) It provides the best study by which children (aged eleven plus) can gain an appreciation of geographical method, and by which they can readily understand the *wholeness* of the subject. For example, the text-books often subdivide an account of a region under headings—relief, climate, vegetation, products, etc. When he makes a geographical study of his home area a child may isolate one of these temporarily, but he knows it is not actually so isolated 'in the field.' For this reason probably the first geographical survey of a region should be that made by a child of his home area (or of some area which the class can visit, perhaps for a week or a fortnight, or perhaps at intervals throughout the year). The children themselves feel the need to separate parts of the study under headings—*e.g.*, rocks, soils, relief, products, etc. They also see very clearly the interrelatedness, for example, of rocks, soils, and products; of rocks, surface features, and scenery; of relief, communications, and town sites; of products, occupations, and distribution of population. The teacher can also use local geography to show the importance of geographical position—the need to view the local area within its wider setting and to consider its relation to the country as a whole.

(vi) In addition local study should make clear the dependence of geography on other subjects. Botany—particularly plant ecology—becomes important, for example, in considering the relation of vegetation to soil types, or of plant characteristics to exposure to sun or wind on a hillside, etc. History is often indispensable—*e.g.*, if one is to do anything more than guess at the reasons why a village or town is situated in a particular spot.

(vii) In the home neighbourhood changes do not (or should not) pass unobserved, particularly in these days of by-pass roads, housing schemes, electrification, shifting centres of

industry, etc. Local studies may sometimes suggest the important truth that many facts of human geography are far from permanent. Some changes may be gradual and imperceptible, others dramatic in their suddenness. For instance, *The Times* of January 2, 1934, drew attention to the fact that the age-old circuitous caravan routes between Damascus and Bagdad are being 'by-passed' by lorries and motor-coaches, which, on account of speed, are relatively independent of wells. Less striking changes in the home district may also serve to illustrate the apparent paradox—that because geography deals with the world as it is, part at least of its subject-matter is constantly changing.

It is clear that local study should figure at all stages in school work. The teacher should refer to the books mentioned below for further suggestions and examples, and to the much fuller, classified bibliography in *Local Studies* (the Geographical Association, 1946).

BOOK-LIST

FLEURE, H. J.: Articles in *The Geographical Teacher*, autumn 1913, spring 1914, summer 1915.

FAIRGRIEVE, J.: *Geography in School*, Chapter XVIII (University of London Press, 1930).

BARKER, W. H.: *Geography in Education and Citizenship*, especially Chapter II (University of London Press, 1927).

BARNARD, H. C.: *Principles and Practice of Geography Teaching*, Chapters VII, IX, X, and XI (University Tutorial Press, 1933).

SIMPSON, C. A.: *The Study of Local Geography* (Methuen, 1950).

—— *Making Local Surveys: An Eye for Country* (Pitman, 1951).

GULLICK, C. F. W. R.: *A Pictorial Survey of England and Wales*, Section I: "The Oxford Region" (Philip, 1939).

ORFORD, E. J. (ed.): *The Book of Walworth* (a local study of part of Southwark) (The Browning Hall Adult School, Browning Street, Walworth, 1925).

ORMSBY, H.: "Regional Survey in a Large City," in *Geography*, spring 1927.

COOKE, M. E.: *A Geographical Survey of a London Borough: St Pancras* (University of London Press, 1932).

BEASLEY, C. G.: *Local Geography* (Murby, 1924).

BUTLER, C. V.: *Village Survey Making* (H.M. Stationery Office, 1929).

WEST MIDLAND GROUP ON POST-WAR RECONSTRUCTION AND PLANNING: *English County. A Planning Survey of Herefordshire* (Faber, 1946).

CARTER, C. C., and BRENTNALL, H. C.: *The Marlborough Country* (Oxford University Press, 1912).

THORNHILL, J. F. P.: *Downs and Weald* (Christophers, 1950) and *Greater London* (Christophers, 1936).

CARRIER, E. H.: *The Inner Gate: a Regional Study of North-west Kent* (Christophers, 1937).

VARIOUS AUTHORS: *The Land of Britain: the Final Report of the Land Utilization Survey of Great Britain*, edited by L. D. Stamp (L.U.S. of Britain, c/o G. W. Bacon and Co.).

FAGG, C. C., and HUTCHINGS, G.: *An Introduction to Regional Surveying* (Cambridge University Press, 1930).

SIMPSON, C. A.: *Rediscovering England* (Benn, 1930).

WICKHAM, A. K.: *The Villages of England* (Batsford, 1932); and other books in the series published by Batsford.

OGILVIE, A. (ed.): *Great Britain: Essays in Regional Geography by Twenty-six Authors* (Cambridge University Press, 1930).

WOOLDRIDGE, S. W., and GOLDRING, F.: *The Weald* (Collins, 1953); and other books in "The New Naturalist" series.

SMITH, W. (ed.): *A Scientific Study of Merseyside* (Liverpool University Press, 1953).

CARTER, C. C.: *Land Forms and Life* (Christophers, 1931).

GARNETT, A.: *The Geographical Interpretation of Topographical Maps* (Harrap, 1953).

Local Studies. Schemes of work prepared under the auspices of the Geographical Association's Standing Committee for Geography in Secondary Schools (the Geographical Association, 1946).

Articles on many areas have been published in *Geography*—*e.g.*, SIMPSON, C. A.: "A Venture in Field Geography" (June 1945).

See also the following: *The Victoria County Histories; The Cambridge County Geographies*; *The County Archæologies*; and the publications of the Leplay Society, the Place Name Society, the Homeland Society, the Census returns and the Statistical Abstract for the United Kingdom (H.M. Stationery Office).

Inquiries should be made at local libraries for civic surveys and other local works, which exist in various forms for many areas.

For local maps see pp. 74–75.

For books on local geology and geological maps see pp. 293–294.

For weather-study see books on pp. 243–244.

CHAPTER XIV

SOME SUGGESTIONS CONCERNING THE INTEGRATED CURRICULUM AND GEOGRAPHICAL WORK WITHIN IT

"THE hard division between 'subjects' is a logical and adult conception that is justified neither by life experience nor as a natural way of learning."[1] It might be suggested that the hard division has developed, like a deficiency disease, in the artificial world of the schools—for, *in truth*, there is no hard division between subjects. One or two examples may illustrate this.

A given set of facts often has a place in each of several subjects. For instance, in tropical and warm temperate countries the existence of stagnant water—*e.g.*, in marshes—may be a menace to health, because such water provides breeding grounds for malaria-carrying mosquitoes. If an investigation of these facts is made from the point of view of the life history and habits of mosquitoes, the study is zoology; from the point of view of the menace to health, it belongs to medicine. Considered in relation to the habitability of certain regions (for example, of reclaimed lowlands formerly desolate on account of malaria) it is geography. There is reason to believe that the spread of malaria, due to incomplete drainage, may have contributed to the decline of Greek civilization—and this is history. The same piece of information is thus associated with one subject rather than another according to the angle from which the information is considered.

The reply could be made that studies of a topic may show great differences, depending on the subjects within which they are carried out. *The world's gold* would be considered

[1] Scottish Education Department, *Primary Education* (a report of the Advisory Council on Education in Scotland) (H.M. Stationery Office, 1946), p. 20.

very differently by geologists, geographers, economists, financiers, technologists and others. Yet a little thought will show that between some there is a kind of meeting ground, a portion of the study common to two or more subjects. For instance, both the geologist and the geographer consider the distribution of gold ore; both craftsman and the physicist consider the properties of gold. Geography treads common ground with other subjects in so many directions that is has often been called a 'pivotal' subject. It shares wide areas, on the one hand with sciences that investigate different aspects of man's environment—geology, meteorology, botany, zoology, etc.—and on the other with subjects whose provinces are man and the works of man—anthropology, history, economics, agriculture, engineering, etc. The common ground between geography and some of these subjects is so broad that a satisfactory boundary line cannot be drawn. History and geography have been called 'the obverse and reverse of the same coin'—suggesting that, in spite of clear differences and a certain 'separateness,' they are aspects of the same thing and neither really exists without the other.

Work in one subject depends on work in others. Just as it is convenient for the gold worker to learn certain facts about gold from the physicist, so the geographer accepts from the geologist some of the facts he needs to know about gold ore. In doing so the craftsman and the geographer are not poaching on the preserves of other workers, or sparing themselves trouble within their own preserves. It is an economical and necessary arrangement that workers should carry out this division of labour which we call specialization. In his turn the geographer provides facts required by historians, economists, and others. One index of the importance of a subject is the service it renders as a 'tool' in other subjects, notably the case with mathematics and languages.

In spite of all this, and granted that it is possible for one individual worker to be both geologist and geographer, or geographer and economist, it remains true that the subjects

have their identities. Each keeps its own point of view and its particular method of approach, even when treading ground held in common with other subjects. It is important for teachers to be aware of the individualities of the subjects (including those of some that do not usually figure in a school curriculum), not only because the subjects are real and convenient, but because they stand for something beyond mere knowledge. Each is associated with a purpose, an attitude of mind, and the ideals for which its workers strive; each has its own high standards, its disciplines, and its traditions. No subject is well taught unless those who learn it receive these things in addition to mere knowledge of facts.

This individuality of the subjects, necessarily recognized when we think of them as *branches of knowledge*, has been toc blindly served in the schools. As branches the subjects have separate identities, but only up to certain limits. Deprived of essential nourishment from the tree they die. Unlike grown-ups, children cannot lop off the branches, and would find no lifeless ones lying around if grown-ups did not pursue this practice of lopping. In other words, when a subject is taught in a manner that is right for children its vital relationship with the whole of knowledge is preserved, and the subject remains alive, growing, and true to itself, because it is still an integral part of the 'tree.'

Pursuing the metaphor a little further, we might point out that at first the foliage hides the very existence of the branches. When he climbs the tree a child becomes aware of them, but *not as wholes*. He is 'climbing a tree' not '*branches*.' Parts of many branches have their usefulness to him, some are inaccessible, and the extremities of all are best avoided. The intricacies and the whole shape of any one cannot be distinguished, but a few, being particularly easy or attractive, are soon identified to some extent.

Viewed in ways of this kind the children's natural approach to learning is seen to be true to knowledge itself. Educational principles are not in conflict but in harmony with the real significance of the subjects. We serve the subjects truly by waiting until the children seek them.

When a piece of work is wholly right for the children it is wholly right for all the subjects concerned. For instance, at the age of seven or eight measuring is an attractive occupation, and the need for it may arise from various lines of interest. (With one class of seven-year-olds it arose from a desire to know exactly what was meant by a distance of 'one hundred yards' mentioned in a story.) To the children the measuring has a special purpose which is their own. The teacher realizes that, apart from its value in other directions, the experience gives the children something that is fundamental in arithmetic and geography. In ways like this it becomes clear that the facts and skills for which a need is felt by the children at a given stage are the very facts and skills desirable, at that stage, for progress in or towards certain subjects—of which, of course, the children are often quite unaware.

It also becomes clear that, when the attack is made at the children's time and in the children's way, they frequently carry it much further than is commonly thought possible. This is abundantly true in work of a geographical kind, as several examples in this book may perhaps suggest—for instance, that described on pp. 269–276. It might be said that geography is one of those attractive branches on which much time is spent, and from which other parts of the tree are easily reached. Because children's interests so often lead them towards and sometimes far into geographical provinces, it is desirable that at least one teacher in every large junior school should have had a geographical training. In schools working with an integrated curriculum all teachers are likely to need help and advice from 'the geographer on the staff.' Although, under these circumstances he would function (outside his own classroom) largely as a consultant, it should be possible when need arises for 'the geographer' to take some of the work with the older children, perhaps by invitation. This does not mean a return to the wrong kind of specialization. It is suggested as a necessary provision for the children. No *one* teacher can gain in more than a *few* subjects the background needed for teaching

eager, inquiring boys and girls of nine to eleven plus; and a teacher who frankly admits the need to call in another 'who knows more about this than I do' is serving one of the higher aims of education. The suggestion that the class teacher 'can look things up' is true only to a certain extent. Of course, every teacher worth his salt is continually doing this; but apart from the limits of time and energy, both at a premium in a teacher's life, the looking-up itself sometimes requires a special background.[1] Indeed, this is part of a specialist's function. The geographer is one who knows how and where to find out, as quickly and as correctly as possible, the answers to geographical questions. (He should also know when one of these questions *cannot* be answered.) A teacher with no geographical training may even fail to perceive the significance of a geographical question asked by an intelligent child.

It is often stated that an 'activity' programme allows no 'specialists.' Yet, if this *dictum* is followed too blindly the 'activity' school will militate against one of its own aims. At the age of about ten, when the spirit of inquiry is fresh and vigorous, children with interests in the natural sciences may spend a year, or longer, without meeting a teacher who fully shares those interests—because the teacher who could do this is wholly engaged with another class. 'The hard divisions between subjects' were partly the result of still harder divisions on the time-table, and freedom from tyranny of time-tables, made for the dovetailing of too many specialists, is wholly desirable. But we need not replace one set of hard divisions by another of a different kind. There is everything to be said for an occasional *ad hoc* visit of the scientist or the geographer to a class taught mainly by the artist, the poet, the musician, or the jack of several trades. These visits, made by arrangement as required, and for work on a topic that has arisen naturally, can be a source

[1] This is particularly true, for instance, with questions about rocks and stones—a common source of interest among children of junior-school age. Typical of the mistakes taught as a result of 'looking-up' without sufficient background is the statement that 'the fossils we have found show that these hills were once under the sea.'

of pleasure and satisfaction to children of nine upward. Part of the value of work with, say, 'a fellow scientist' or 'a fellow geographer' is the encouragement and inspiration which a child receives from a grown-up who genuinely shares his interests and fully appreciates his questions. It is then that 'the spark is kindled.' To the geographer himself the questions asked by ten-year-olds are often stimulating, and sometimes more penetrating than those of older pupils. Probably more important is the fact that only in the light of his special knowledge and understanding can the geographer (or other 'specialist') see *how to lead the children to discover* the answers to their own questions.[1] Such visits may not be frequent, and certainly need not be regular; but their possibility and advantages should be recognized.

The presence on the staff of a 'geographer consultant' is valuable in another way. Without a special background a teacher does not always realize when looking-up is necessary, nor how to discriminate between books he comes across. This is one of the reasons why age-old mistakes are still handed on; for example, in geography lessons about '*Red Indians in general.*' These are usually taken 'in response to the children's interest in Red Indians' or 'in connexion with *Hiawatha.*' If such lessons are given at all they should serve to show something of the diversity among American Indians;[2] the fact that those who, on ceremonial occasions, wear the war bonnet, are prairie dwellers, and that their dwellings are not *wigwams.* If the whole thing remains poetic fantasy and is treated as such, the children's *Hiawatha* may be copied—with *tipi* and war bonnet—from a prairie people, although he is assumed to be a native of the forest. In that case, however, no part of the work can be claimed as geographical.

Geography itself is not usually classed as one of the 'tool subjects,' but the tools of geography are, or should be, in

[1] For instance, questions seeking explanations of the changes in the length of day and night, and in the position of the setting sun—both asked by intelligent ten-year-olds.

[2] See, for example, Clark Wissler, *The American Indian* (Oxford University Press, 1922).

very general use, and every teacher needs to know how to use them correctly. This applies to work with all children from the age of seven upward. It also applies in all types of school, by no means only those using an integrated curriculum. For example, the care taken by a geographically minded teacher to prepare children to use an atlas with understanding by the age of, say, ten can be seriously hampered or even defeated in its purpose if other teachers (*e.g.*, in history or Scripture) use maps prematurely or ungeographically. Moreover, an enlightened pupil is rightly critical of a teacher who is obviously ignorant or careless about points of technique in his references to maps.

Geographical work also makes use of tools from other subjects, and should likewise be planned with full awareness of the stages by which the use of these tools is mastered. For instance, a common mistake is to attempt drawing to scale in the earliest map-work with children aged about eight —*i.e.*, when the children's arithmetic is not equal to it. Yet the *idea* of scale and the use of a scale line is all that the geography needs (apart from a familiarity with units of length, readily gained through 'measuring' activities). Certain geometrical ideas, facts, or skills can often be learned as need arises, for example, when investigating the causes of changing lengths of sun-cast shadows during the day and round the year. It also gives children great satisfaction to discover an application of a piece of knowledge they have gained previously in another connexion. This is by no means uncommon in geographical work with children who have done a little practical geometry. At the age of ten to eleven children are ready for certain kinds of geometrical work (which might well replace some of the more advanced arithmetic learned hitherto). This readiness proved to coincide exactly with the need found by one class of children for simple geometrical knowledge in several different pieces of geographical work.

The importance of practical work of all kinds, especially for junior-school children, is now widely recognized, and 'activity' methods are often, though by no means necessarily,

associated with some form of handwork. Therefore it seems desirable to include here a few points concerning children's handwork in its relation to geographical studies.

Geography and Handwork

The making of a model to express the knowledge they have gained—*e.g.*, concerning a place, a dwelling, etc.—is a favourite occupation with many children, and has long been recognized by teachers as a valuable activity in junior-school work. In fact, the teacher's enthusiasm for it has sometimes been carried to such lengths that the educational value of the work introduced is at least open to doubt! For example, a class of children aged about eight were learning about some of the Kafir peoples in South Africa. The children were told how the Kafir huts were grouped together within the *kraal*, and the teacher described, with the help of a blackboard sketch, the appearance of each hut, with its cone-shaped thatched roof and round wall of mud.[1] She then suggested that the children should "make a Kafir *kraal*," and produced the materials for use. These consisted of pieces of brown paper, carefully cut into the necessary shapes beforehand, so that simply by fastening the edges under her direction the children could make short brown-paper cylinders for the walls and brown-paper cones for the roofs of the houses. A little raffia was cut into lengths and gummed on to the roofs to represent thatch; and within a very short time enough 'Kafir houses' were ready to make several '*kraals*.'

The above example illustrates a number of the mistakes often made in work of this kind. In the first place, it was over-directed: the children did not work it out for themselves. They did not have access to sufficient information, partly in the form of pictures, from which they could obtain the necessary intimacy with Kafir *kraals*; probably only the teacher had a clear mental picture of one. The materials used were quite unsuitable, because they could not be

[1] This is by no means the only form of Kafir dwelling. *Cf.*, for example, Dudley Kidd, *The Essential Kafir* (Black, 1925).

treated in the manner in which mud and thatch are worked. The huts were not built by a process even faintly resembling that used by the Kafirs. If substitute materials have to be used they should resemble the originals as closely as possible in appearance, texture, properties, etc. There is always a possibility that some children will retain the idea that Kafirs live in paper houses! Students have confessed that for years during their childhood they had imagined Eskimo living in houses of soap or of salt, according to the materials of which they had constructed model *igloos*.

It is not enough merely to say that of course the houses are not really made of this or of that. The spoken word, telling of the right materials, is not remembered by a child so clearly as the model on which he has spent his creative energy, and from which he has derived considerable pleasure. A reply to this criticism is that children are always ready and able to pretend—*e.g.*, that salt is snow. That is true, but the pretending is only genuine when the correct thing has been clearly and truly seen in the mind's eye before the pretending takes place, and also when the pretending takes a form which is faithful to the original—*e.g.*, when the Eskimo snow *igloo* is not shaped entire out of a block of salt, but when it is built up in the correct fashion with 'snow' bricks.[1]

If the work is to have these attributes, then it is clear that not only should the suggestion for making the model come from the children, but they should themselves gain intimate knowledge, as far as possible from first-hand sources, including plenty of good photographs, before they begin even to plan it. The model must be worked out by the children, and they rather than the teacher must decide on substitute materials when necessary, experimenting until they find one that meets the case. Children's critical powers, often naturally keen, should not be blunted by an implied suggestion that anything will do. When the constructive work is

[1] See, for example, Stefansson, *Hunters of the Great North* (Harrap, 1923).

under way the need is felt for further study of pictures, visits to museums, and reference to other sources of information. All these considerations, together with those put forward on pp. 130–133, seem to prove that work of this kind is not suitable for children younger than nine to ten years at least. (It is still quite common to find it attempted with children of seven.)

This does not mean that children younger than nine to ten cannot make models or scenes arising out of their geographical studies. But the work for younger children should be concerned with subjects within or closer to their own experiences—*e.g.*, a busy thoroughfare, a river and bridges, a railway goods' station, a farm; with older children models of many things beside dwellings are possible—*e.g.*, a working model of a *sakieh* (Persian wheel), a *shaduf*, a coal-mine, a relief model of the home neighbourhood (see pp. 266–268), etc.

More often the activity is directed towards the making of an object of interest to the children for its own sake, but which, to be correctly constructed, demands knowledge of a geographical character—*e.g.*, a model railway-track, a canal with locks, bridges, an aerodrome, a harbour. These and many other things in which children delight cannot be worked out properly without investigations in many fields, that of geography taking an important place.

Educators have long recognized the value of giving children some practical experience of the great crafts that have been fundamental in the progress of the human race—*e.g.*, pottery, weaving, etc. It goes without saying that none but the simplest forms of these crafts are suitable. Only the older children, as a rule, can use a potter's wheel. Yet all but the very youngest can make pots, using processes similar to those employed by primitive peoples. To study pictures or museum examples of primitive looms, and to know a little about some of the peoples—*e.g.*, in West Africa—who use them, is essential if the children are to be able to regard their simple weaving in some kind of perspective. This might be given by reference to the use of similar looms in ancient times, but with the younger junior-

school children the loom that is used nowadays has generally more appeal, and this can more often be studied in actual photographs. In the case of pottery it is possible to do both. Peasants in the Nile Valley to-day use methods which closely resemble those of the ancient Egyptian potters.[1] It is also suitable for the children to learn about, though they cannot imitate, the great industries which represent the present-day developments of these and other crafts, and this necessarily involves geography.

The above may be summarized as a series of principles that should be kept in mind by any teacher who plans handwork in connexion with geography. Handwork should not demand a type of geographical study unsuitable to the age of the children, nor should geography lessons introduce handwork that is inappropriate to the children's capacity. The work should be the expression by the children of their own knowledge. It should not be directed by the teacher without the children's clear visualization at the outset of what they are making, its purpose, characteristics, etc. The children must possess or be able to acquire such detailed knowledge as is necessary to carry out the work faithfully, not ignoring essential features, not slurring over omissions, not implying that what they do not know may be safely left to the imagination and filled in as they please. Handwork is not geographical if it does not show accuracy and precision—*e.g.*, in matters of scale, materials used, etc. A genuine effort must be made to get things right, and if makeshift materials are used the facts of the case should be clear even to the dullest members of the class. Otherwise the handwork is educationally wrong at least for those children who by its aid are fixing clear but faulty impressions.

Much of what has been said about handwork and geography exemplifies the need for respect, in the minds of teachers using 'activity' and other methods, for the standards and disciplines of *all* subjects. To ignore these is to mutilate not only the subject, but the whole, of which the subject is

[1] See, for example, W. S. Blackman, *The Fellahin of Upper Egypt* (Harrap), 1927.

but an inseparable part. The need for this respect is not in any way reduced because children, by their inability to distinguish subjects as separate entities, show us how to preserve the whole from another kind of mutilation.

SUGGESTIONS FOR FURTHER READING

NUNN, T. P.: *Education : its Data and First Principles*, Chapter XV (E. Arnold, 1930).

BRANOM, M. E. and F. K.: *The Teaching of Geography*, Chapter III (Ginn, 1925).

WELPTON, W. P.: *The Teaching of Geography* (University Tutorial Press, 1923).

BARNARD, H. C.: *Principles and Practice of Geography Teaching* (University Tutorial Press, 1933).

BOOKS WHICH ILLUSTRATE THE RELATION OF GEOGRAPHY TO OTHER SCHOOL SUBJECTS

(*a*) Nature Study

ELTON, C.: *Animal Ecology* (Sidgwick and Jackson, 1951).

NEWBIGIN, M. I.: *Animal Geography: the Faunas of the Natural Regions of the Globe* (Oxford University Press, 1913).

—— *Plant and Animal Geography* (Methuen, 1936).

HARDY, M. E.: *The Geography of Plants* (Oxford Univ. Press, 1920).

JOHNSTONE, M. A.: *Plant Ecology: the Distribution of Vegetation in the British Isles arranged on a Geological Basis* (Dent, 1928).

TANSLEY, A. C.: *Introduction to Plant Ecology* (Allen and Unwin, 1946).

—— *Britain's Green Mantle* (Allen and Unwin, 1949).

—— *The British Islands and their Vegetation* (Cambridge University Press, 1939).

TURRILL, W. B.: *British Plant Life* (Collins, 1948); and many other books in "The New Naturalist" Series.

RICHARDS, P. W.: *The Tropical Rain Forest* (Cambridge University Press, 1952).

HINGSTON, R. W. G.: *A Naturalist in the Guiana Forest* (E. Arnold, 1932).

BUXTON, P. A.: *Animal Life in Deserts* (E. Arnold, 1923).

WARD, O. KINGDON: *Plant Hunting on the Edge of the World* (Gollancz, 1930).

HAVILAND, M. D.: *Forest, Steppe, and Tundra: Studies in Animal Environment* (Cambridge University Press, 1926).

(*b*) History

SEMPLE, E. C.: *The Geography of the Mediterranean Region: its Relation to Ancient History* (Constable, 1932).

DARBY, H. C.: *Historical Geography of England before A.D. 1800* (Cambridge University Press, 1936).

FOX, SIR CYRIL: *The Personality of Britain* (National Museum of Wales, 1947).

NEWBIGIN, M. I.: *The Mediterranean Lands: an Introductory Study in Human and Historical Geography* (Christophers, 1924).

LYDE, L. W., and GARNETT, A.: *Time and Place* (Blackwell, 1933).

MACKINDER, H. J.: *Britain and the British Seas* (Oxford University Press, 1907).

FLEURE, H. J.: *A Natural History of Man in Britain* (Collins, 1951), in the "New Naturalist" Series.

MYRES, J. L.: *Geographical History in Greek Lands* (Oxford University Press, 1953).

EAST, W. G.: *The Geography behind History* (Nelson, 1938).

MITCHELL, J. B.: *Historical Geography* (English Universities Press, 1954).

(*c*) Scripture

SMITH, G. ADAM: *Historical Geography of the Holy Land* (Hodder and Stoughton, revised edition, 1931).

FULLEYLOVE, J., and KELMAN, J.: *The Holy Land* (Black, 1902).

NEIL, J.: *Everyday Life in the Holy Land* (Church Missions to Jews, 1930).

GRANT, E.: *The People of Palestine* (Lippincott, 1921).

GROSER, W. H.: *Round the Year in Palestine* (National Sunday School Union, 1925).

BAIKIE, J.: *Lands and Peoples of the Bible* (Black, 1932).

HOWARTH, E. K.: *A Geography of the Bible* (Clarendon Press, 1922).

GRAY, D.: *Human Geography in the Old Testament* (Friends' Book Centre, 1933).

SANDERS, E. M.: *The Holy Land*: Part I, "The Land": Part II, "The People and their Work" (Philip, 1935).

ALBRIGHT, W. F., and FILSON, F. V.: *The Westminster Historical Atlas to the Bible* (S.C.M. Press, 1945).

(*d*) Mathematics

JAMESON, A. H., and ORMSBY, M. T. M.: *Mathematical Geography* (Pitman, 1927).

PERROT, S. W.: *Surveying for Schools* (Chapman and Hall, 1930).

RICHARDSON, W. H.: *Surveying for Schools and Scouts* (Philip, 1929).

ORFORD, E. J.: *Practical Geography* (Pitman, 1919).

FAIRGRIEVE, J., and YOUNG, E.: *A Class Book of Practical Geography* (Philip, 1928).

See also book-list at pp. 124–125.

INDEX